

## **Attachment A: Flow Frequency Memorandum**

## MEMORANDUM

**DEPARTMENT OF ENVIRONMENTAL QUALITY**  
**Piedmont Regional Office**  
**4949-A Cox Road Glen Allen, Virginia 23060**

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**SUBJECT:** Flow Frequency Determination / 303(d) Status  
Town of Tappahannock WWTP – VA0071471

**TO:** Janine Howard

**FROM:** Jennifer Palmore, P.G.

**DATE:** November 30, 2011

**COPIES:** Modeling File

The Town of Tappahannock's wastewater treatment plant (WWTP) discharges to Hoskins Creek in Essex County. The outfall is located at rivermile 3-HOK002.90. Flow frequencies have been requested at this site for use by the permit writer in developing effluent limitations for the VPDES permit.

Hoskins Creek is tidally influenced at the discharge point. Flow frequencies cannot be determined for tidal waters and the DEQ default dilution ratios should be used for mixing analyses. The Water Quality Standards designate the receiving stream as estuarine; therefore the saltwater criteria should be applied. Hoskins Creek is located within the Rappahannock River mesohaline segment (RPPMH) and is designated as Migratory Spawning and Nursery habitat.

During the 2010 305(b)/303(d) Water Quality Assessment, the receiving stream was considered a Category 5D water ("The Water Quality Standard is not attained where TMDLs for a pollutant(s) have been developed but one or more pollutants are still causing impairment requiring additional TMDL development.") The applicable fact sheets are attached. The stream was impaired of the Recreation Use due to enterococci violations. In addition, the mesohaline Rappahannock estuary, which includes tidal Hoskins Creek, is impaired of the Aquatic Life Use due to low dissolved oxygen. The Fish Consumption Use is fully supporting with observed effects due to mercury and PCB exceedances. The Wildlife Use was assessed as fully supporting. The Shellfish Consumption Use is considered removed due to VDH Shellfish Prohibition 025-068C, 11/14/2005.

Tappahannock WWTP was included in the Chesapeake Bay TMDL, which addressed dissolved oxygen, chlorophyll a, and SAV impairments in the mainstem Bay and its tidal tributaries. The TMDL was approved by the EPA on 12/29/2010. The facility is considered a significant wastewater discharger and was assigned individual wasteload allocations for total nitrogen, total phosphorus, and total suspended solids (TSS). The nutrient allocations are administered through the Watershed Nutrient General Permit; the TSS allocations are considered aggregated and facilities with technology-based TSS limits are considered to be in conformance with the TMDL.

The Bacterial TMDL for the Hoskins Creek Watershed was approved by the EPA on 3/27/2008 and by the SWCB on 4/28/2009. The TMDL was later modified on 12/20/2010. The Town of Tappahannock WWTP was assigned an enterococci wasteload allocation of 1.26E+09 counts/day based on a design flow of 0.95 MGD at a water quality standard of 35 counts/100mL.

In addition, the discharge is within the study area for the Upper Rappahannock Shellfish TMDL, which was approved by the EPA on 8/10/2010 and by the SWCB on 12/13/2010. The TMDL was modified on 8/4/2011. Tappahannock WWTP received a fecal coliform wasteload allocation of 7.19E+09 MPN/day based on a design flow of 0.95 MGD at a geometric mean effluent limit of 200 MPN/100mL.

Flow Frequency Determination  
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Water quality data from monitoring station 3-HOK000.74 is attached. The station is located on Hoskins Creek at the Route 360 bridge, which is approximately 2.16 miles downstream of the outfall. Modeling efforts for this facility excluded data collected before 1990. I am continuing that practice to ensure conformity with the modeling.

Both model results and actual in-stream monitoring data indicate that dissolved oxygen can be at or below 5.0 mg/L, therefore Hoskins Creek has been considered a Tier 1 water.

If you have any questions regarding this analysis, please do not hesitate to ask.

# 2010 Fact Sheets for 303(d) Waters

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<b>RIVER BASIN:</b>	Rappahannock River Basin	<b>HYDROLOGIC UNIT:</b>	02080104
<b>STREAM NAME:</b>	<b>Rappahannock River</b>		
<b>TMDL ID:</b>	RPPMH-DO-BAY	<b>2010 IMPAIRED AREA ID:</b>	CB-RPPMH
<b>ASSESSMENT CATEGORY:</b>	5A	<b>TMDL DUE DATE:</b>	2010
<b>IMPAIRED SIZE:</b>	123.53 - Sq. Mi.	<b>Watershed:</b>	VAP-E22E
<b>INITIAL LISTING:</b>	1998		
<b>UPSTREAM LIMIT:</b>	Mesohaline boundary		
<b>DOWNTSTREAM LIMIT:</b>	Mouth at Chesapeake Bay		

The mesohaline Rappahannock River and tidal tributaries.

## CLEAN WATER ACT GOAL AND USE SUPPORT:

Aquatic Life Use - Not Supporting, Open Water Subuse - Not Supporting, Deep Water Subuse - Not Supporting, Deep Channel Use - Fully Supporting

**IMPAIRMENT:** Dissolved Oxygen

The mainstem of the Rappahannock River from Myrtle Swamp to its mouth was originally listed in 1998 by DEQ due to dissolved oxygen exceedances and nutrient overenrichment. The EPA extended the segment upstream to the confluence with Totuskey Creek. In the 2004 cycle dissolved oxygen exceedances were noted in deepwater and deep channel stations downstream of the confluence with Lancaster Creek (Morattico), which is further downstream.

The new Chesapeake Bay Water Quality Standards were implemented during the 2006 cycle. The mesohaline portion of the Rappahannock fails the Open Water Subuse's summer 30-day dissolved oxygen criteria and applicable areas fail the Deep Water 30-day dissolved oxygen criteria. During the 2008 cycle, the Deep Channel Subuse's instantaneous minimum dissolved oxygen criteria was violated, however the segment met the use during the 2010 cycle and will be delisted. The Open Water Subuse's 30-day rest-of-year standard was met and there was insufficient data to assess the other dissolved oxygen criteria.

**IMPAIRMENT SOURCE:** Point Source, Nonpoint Source

Tributary strategy has been developed.

**RECOMMENDATION:** Problem Characterization

# 2010 Fact Sheets for 303(d) Waters

<b>RIVER BASIN:</b>	Rappahannock River Basin	<b>HYDROLOGIC UNIT:</b>	02080104
<b>STREAM NAME:</b>	<b>Hoskins Creek</b>		
<b>TMDL ID:</b>	E23E-03-BAC	<b>2010 IMPAIRED AREA ID:</b>	CB-RPPMH
<b>ASSESSMENT CATEGORY:</b>	4A	<b>TMDL DUE DATE:</b>	2010
<b>IMPAIRED SIZE:</b>	0.0842 - Sq. Mi.	<b>Watershed:</b>	VAP-E23E
<b>INITIAL LISTING:</b>	1994		
<b>UPSTREAM LIMIT:</b>	Tappahannock STP		
<b>DOWNTSTREAM LIMIT:</b>	Rappahannock River confluence		

The tidal portion of Hoskins Creek from the Tappahannock STP to its mouth at the Rappahannock River.

## CLEAN WATER ACT GOAL AND USE SUPPORT:

Recreation Use - Not Supporting

## IMPAIRMENT:

Enterococci

Tidal Hoskins Creek was initially included on the 1994 303(d) list based on excessive fecal coliform standard exceedances recorded at the Rt. 360 bridge (3-HOK000.74). The upstream limit was extended to the Town of Tappahannock STP in the 1998 cycle in recognition that the STP may be a contributing source. During the 2006 cycle, the segment remained impaired and enterococci was added as an impairing cause. TMDL monitoring was initiated in the 2008 cycle; the impairment was confirmed, extended upstream to the tidal limit, and switched to enterococci based on enterococci exceedances at multiple stations.

The entire segment remained impaired in the 2010 cycle due to the following enterococci exceedance rates:

5/13 at 3-CRC000.15

10/13 at 3-HOK000.15

24/36 at 3-HOK000.74

7/13 at 3-HOK002.74

7/13 at 3-HOK003.61

However, the bacterial TMDL, which was approved by the EPA on 3/27/2008 and by the SWCB on 4/28/2009 only addressed the area from the Tappahannock STP to its mouth. The extension will be split off and will be addressed in fact sheet E23E-03-BAC2; it is considered to be nested. Both areas are Category 4A.

## IMPAIRMENT SOURCE:

Nonpoint Sources, PS - Municipal

Bacteria was allocated to point and nonpoint sources.

## RECOMMENDATION:

Implementation

## **Attachment B: Plant Flow Diagram**

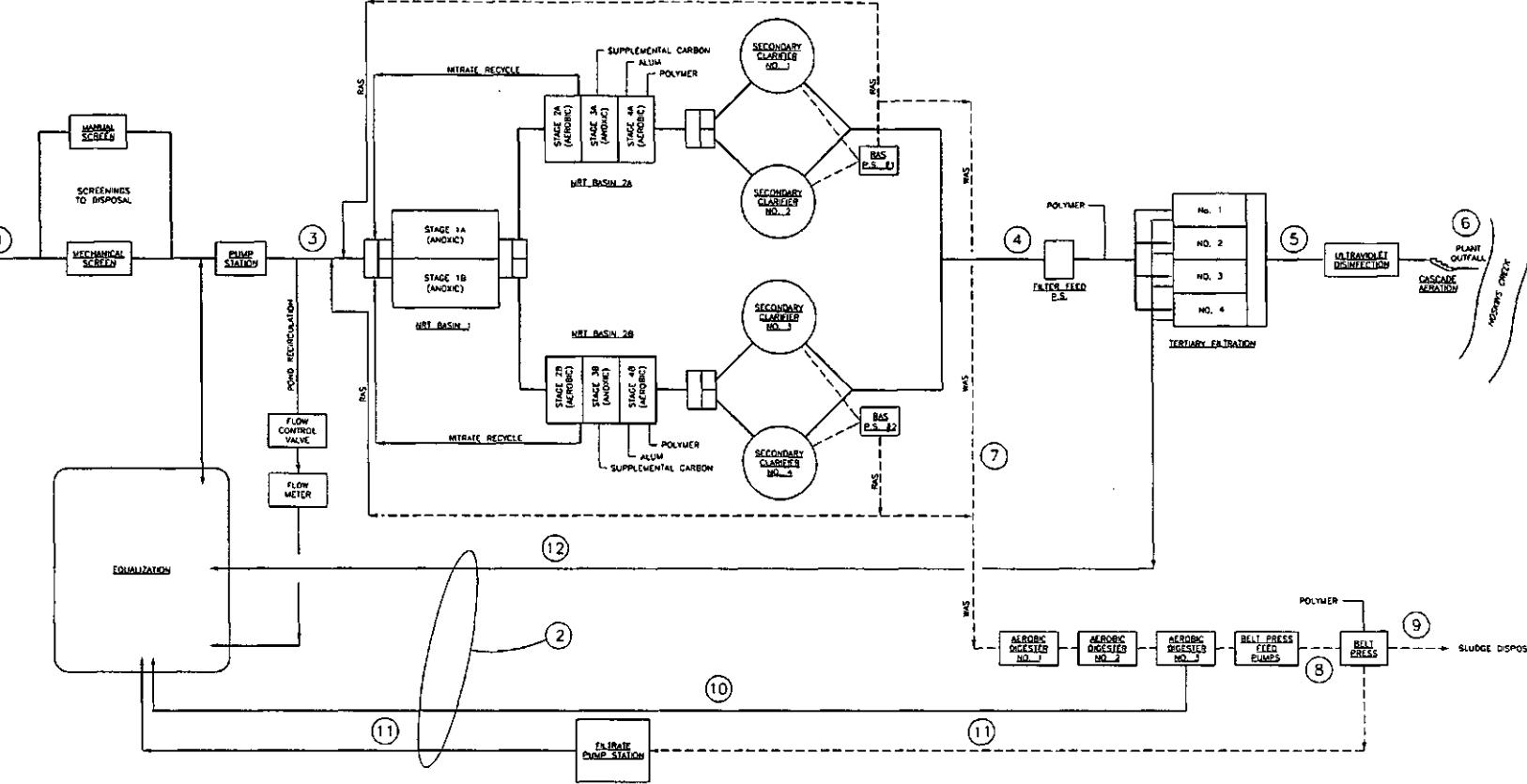
**Wiley|Wilson**  
Constant Progress  
127 Nationwide Drive  
Lynchburg, Virginia 24502-4272

### PROCESS FLOW DIAGRAM

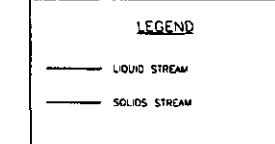
PROJECT: TOWN OF TAPPAHANNOCK WWTP  
TITLE: VPDES PERMIT RENEWAL

COMM. NO.	207064
DRAWN MCT	CHECKED AST
DWG. REFERENCE NO. 07064 SK-02.DGN	
SKETCH NO. SK-02	
DATE 11/28/2011	
REV.	

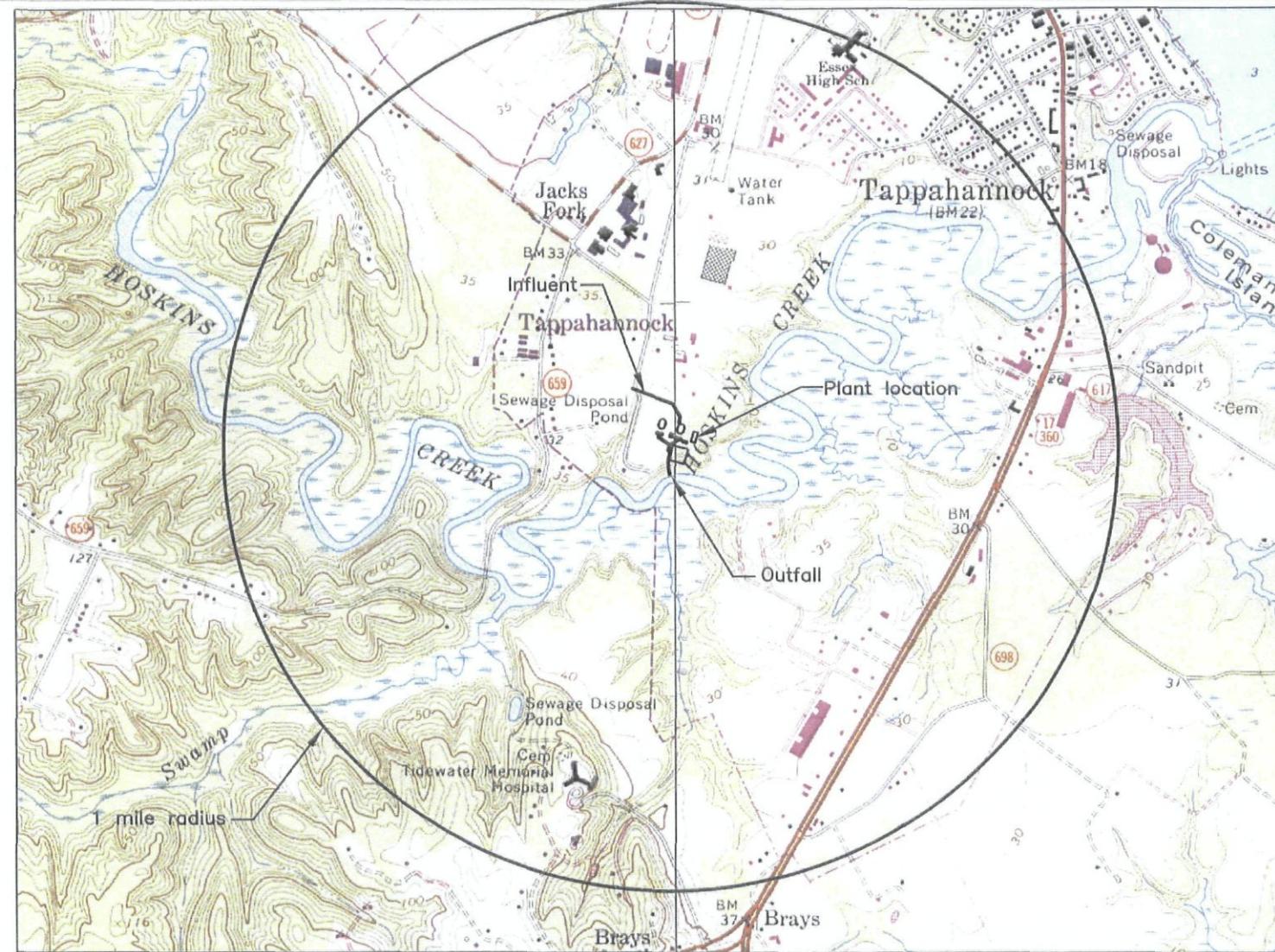
(1) Raw Wastewater (2) Pump Station (3) Pump Station (4) Pump Station (5) Pump Station (6) Pump Station (7) Pump Station (8) Pump Station (9) Pump Station (10) Pump Station (11) Pump Station (12) Pump Station



Constituent	Raw Wastewater	Recycle Streams	Activated Sludge Influent	Secondary Effluent	River Effluent	Final Effluent	WAS	Digester Influent	Digester Effluent	Solids to Dewater	Dewatered Sludge	BPP Nitrate	Filter Backwash
Annual Average Daily Flow (AADF - gpd)	800,000	43,120	843,120	819,378	769,379	23,741	23,741	7,407	7,407	621	16,334	6,785	20,000



**Attachment C: Topographic Map (Tappahannock Quadrangle- 147A) and Aerial Image**



NOT TO SCALE



PROJECT    TOWN OF TAPPAHANNOCK WWTP  
TITLE    VPDES PERMIT RENEWAL

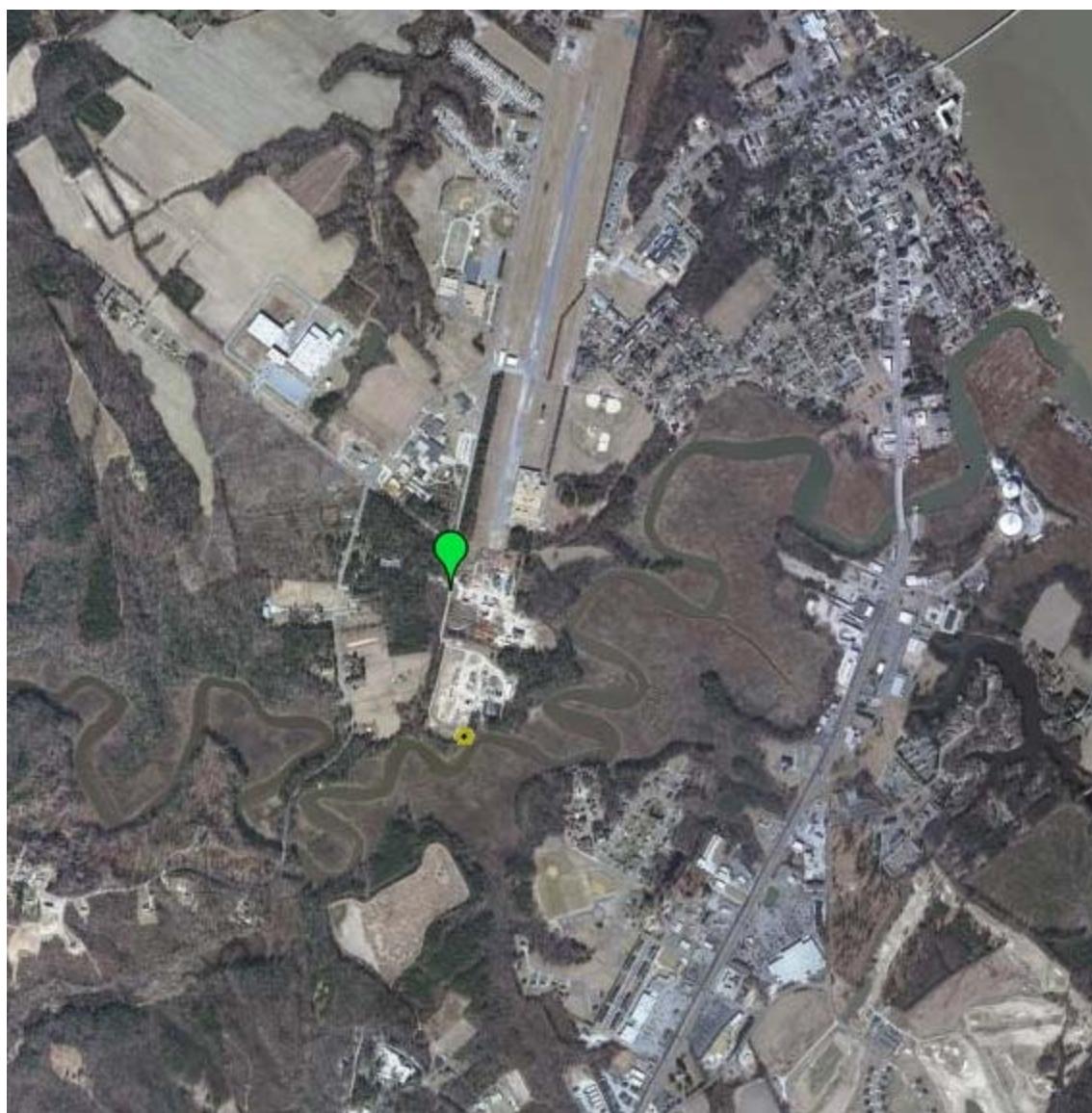
VICINITY MAP

COMM. NO.	207064
DRAWN MCT	CHECKED AST
DWG. REFERENCE NO.	07064_SK-01.DGN
SKETCH NO.	SK-01
DATE	REV.

127 Nationwide Drive  
Lynchburg, Virginia 24502-4122

**Wiley|Wilson**  
Constant Progress

Aerial Image of WWTP location (green marker) and outfall location (yellow dot)



## **Attachment D: Site Inspection Report**

# MEMORANDUM

## DEPARTMENT OF ENVIRONMENTAL QUALITY *Piedmont Regional Office*

4949-A Cox Rd Glen Allen, VA 23060

(804) 527-5020

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SUBJECT: Site Visit- VA0071471- Town of Tappahannock WWTP Site Visit

TO: File

FROM: Janine Howard, Water Permit Writer

DATE: 23 January 2012

On January 19, 2012 at 10am I met with Steve Short, Superintendent, at the Town of Tappahannock Wastewater Treatment Plant. The wastewater treatment plant is located at 400 Mill Road (State Route 723) in Tappahannock, VA. The facility serves the town and surrounding commercial area and a population of approximately 2,070 individuals.

Steve and I toured the facility beginning with the headworks. The influent flows via two force mains (located on the north and south side of the town) to the influent pump station (Figure 1). At the time of the site visit, the plant was being operated in "offline" mode, meaning that influent flows to the aerated equalization (EQ) basin when influent to the plant exceeds the influent pump station capacity. In "online" mode all influent would first be pumped to the EQ basin before proceeding to the screening stage of treatment. The staff maintains an influent composite sampler and they test the influent for pH and alkalinity daily. The influent solids and cBOD<sub>5</sub> are tested monthly to determine the percent removal that the plant is achieving.

Adjacent to the influent pump station is an automatic step screen (Figure 1) which screens the influent for larger solids. The solids collected are sent to a hopper and are automatically deposited into a waste bin. The solids are periodically landfilled along with the sludge generated on site. Following screening, the wastewater flows to splitter box 1. The plant consists of two treatment trains and splitter box 1 diverts half of the flow to either side of the anoxic "NRT" or Nutrient Reduction Tank, the first stage of the four-stage Bardenpho process. The former oxidation ditches were converted in 2010 into the remaining three stages of the Bardenpho process (Figure 2) for biological nutrient removal (BNR). Splitter box 2 sends the flow to one of the two trains and following BNR, the wastewater flows to splitter boxes 3 and 4 which divert the flow to one of the two clarifiers that are located at the end of each Bardepho train (four clarifiers in total, two at the end of each treatment train). At present, only one clarifier is being operated at the end of each treatment train. There is an alum feed into splitter boxes 3 and 4 that can be used as needed to facilitate phosphorus removal. The clarifiers are equipped with automatic skimmers and sludge from the clarifiers is sent to the digesters (Figure 3). From the clarifier the water flows to the filter feed pump station where it is pumped to one of four tertiary filters. The plant utilizes a Severn Trent TETRA® Process Technologies, Deepbed™ Filtration System (Figure 4) which was installed as part of the upgrades in 2010. Three filters are backwashed per day, in series, with all of the backwash water flowing to the EQ basin. The filter media is projected to last over 20 years. The backwash process lasts 30-40 minutes per filter. The filtered water flows to the clear well (Figure 5), approximately 20 feet in depth, before overflowing from the well (Figure 6) and traveling to the UV disinfection system. The UV disinfection system (Figure 7) consists of two banks of bulbs, each bank being designed to handle 1 MGD of flow. The bulbs are manually cleaned on an as needed basis. Following disinfection, the effluent flows to the outfall which consists of a step aerator, followed by overflow onto a riprap spillway (Figure 8). A composite sampler is maintained at the top of the step aerator for final effluent sampling. Sludge from the

treatment process is aerobically digested in three digesters utilized in series. Sludge is dewatered using a belt press and disposed of at a landfill.

The grounds were well kept and orderly and all materials stored on site were covered and kept within secondary containment structures. Lime is stored undercover in the influent pump house. The facility has a hypochlorite building and feed system where hypochlorite is maintained for use in the event of a foaming problem in the plant. Polymer is also stored in this building. The materials are stored with secondary containment and floor drains flow directly to the EQ basin in the event of a spill. The plant has a carbon feed system, also stored undercover. The facility uses "MicroC glycerin" as a supplemental food source and the chemical is stored in a building with secondary containment and drains that flow to the EQ basin (Figure 9). The facility has two alum tanks and one caustic tank, each with approximately 6,000 gallons of storage capacity (Figure 10). The tanks are kept within an approximately four foot high containment wall. The laboratory was viewed and was in immaculate order. The staff maintains a dedicated file room that is clearly marked, for storage of the plant Operations and Maintenance Manual and maintenance records.



Figure 1. Influent pump station, adjacent automatic step screen, EQ basin (right)

Figure 2. Four-stage Bardenpho tank



Figure 3. Clarifier

Figure 4. Severn Trent Deepbed<sup>TM</sup> Filtration system



Figure 5. Clear well



Figure 6. Clear well overflow



Figure 7. UV disinfection system



Figure 8. Outfall 001



Figure 9. Carbon source storage and secondary containment



Figure 10. Alum and caustic storage tanks

**Attachment E: Effluent Data (Water Quality Criteria  
Monitoring data, DMR data)**

**ATTACHMENT A**  
**DEPARTMENT OF ENVIRONMENTAL QUALITY**  
**WATER QUALITY CRITERIA MONITORING**

CASRN#	CHEMICAL	EPA ANALYSIS NO.	QUANTIFICATION LEVEL <sup>(1)</sup>	REPORTING RESULTS	SAMPLE TYPE <sup>(2)</sup>	SAMPLE FREQUENCY
<b>METALS</b>						
7440-36-0	Antimony, dissolved	(3)	1.4	<QL	G or C	1/5 YR
7440-38-2	Arsenic, dissolved	(3)	1.0	<QL	G or C	1/5 YR
7440-43-9	Cadmium, dissolved	(3)	0.3	<QL	G or C	1/5 YR
16065-83-1	Chromium III, dissolved <sup>(8)</sup>	(3)	3.6	<QL	G or C	1/5 YR
18540-29-9	Chromium VI, dissolved <sup>(8)</sup>	(3)	1.6	<QL	G or C	1/5 YR
7440-50-8	Copper, dissolved	(3)	0.50	<QL	G or C	1/5 YR
7439-92-1	Lead, dissolved	(3)	0.50	<QL	G or C	1/5 YR
7439-97-6	Mercury, dissolved	(3)	1.0	<QL	G or C	1/5 YR
7440-02-0	Nickel, dissolved	(3)	0.94	<QL	G or C	1/5 YR
7782-49-2	Selenium, dissolved	(3)	2.0	<QL	G or C	1/5 YR
7440-22-4	Silver, dissolved	(3)	0.20	<QL	G or C	1/5 YR
7440-28-0	Thallium, dissolved	(4)	(5)	<QL	G or C	1/5 YR
7440-66-6	Zinc, dissolved	(3)	3.6	1.3	G or C	1/5 YR
<b>PESTICIDES/PCB'S</b>						
309-00-2	Aldrin	608	0.05	<QL	G or C	1/5 YR
57-74-9	Chlordane	608	0.2	ND	G or C	1/5 YR
2921-88-2	Chlorpyrifos (synonym = Dursban)	(4)	(5)	<QL	G or C	1/5 YR
72-54-8	DDD	608	0.1	<QL	G or C	1/5 YR
72-55-9	DDE	608	0.1	<QL	G or C	1/5 YR
50-29-3	DDT	608	0.1	<QL	G or C	1/5 YR
8065-48-3	Demeton	(4)	(5)	<QL	G or C	1/5 YR
333-41-5	Diazinon	(4)	(5)	<QL	G or C	1/5 YR
60-57-1	Dieldrin	608	0.1	<QL	G or C	1/5 YR
959-98-8	Alpha-Endosulfan	608	0.1	<QL	G or C	1/5 YR
33213-65-9	Beta-Endosulfan	608	0.1	<QL	G or C	1/5 YR
1031-07-8	Endosulfan Sulfate	608	0.1	<QL	G or C	1/5 YR

CASRN#	CHEMICAL	EPA ANALYSIS NO.	QUANTIFICATION LEVEL <sup>(1)</sup>	REPORTING RESULTS	SAMPLE TYPE <sup>(2)</sup>	SAMPLE FREQUENCY
72-20-8	Endrin	608	0.1	<QL	G or C	1/5 YR
7421-93-4	Endrin Aldehyde	(4)	(5)	<QL	G or C	1/5 YR
86-50-0	Guthion	(4)	(5)	<QL	G or C	1/5 YR
76-44-8	Heptachlor	608	0.05	<QL	G or C	1/5 YR
1024-57-3	Heptachlor Epoxide	(4)	(5)	<QL	G or C	1/5 YR
319-84-6	Hexachlorocyclohexane Alpha-BHC	608	(5)	<QL	G or C	1/5 YR
319-85-7	Hexachlorocyclohexane Beta-BHC	608	(5)	<QL	G or C	1/5 YR
58-89-9	Hexachlorocyclohexane Gamma-BHC or Lindane	608	(5)	<QL	G or C	1/5 YR
143-50-0	Kepone	(9)	(5)	<QL	G or C	1/5 YR
121-75-5	Malathion	(4)	(5)	<QL	G or C	1/5 YR
72-43-5	Methoxychlor	(4)	(5)	<QL	G or C	1/5 YR
2385-85-5	Mirex	(4)	(5)	<QL	G or C	1/5 YR
56-38-2	Parathion	(4)	(5)	<QL	G or C	1/5 YR
1336-36-3	PCB Total	608	7.0	ND	G or C	1/5 YR
8001-35-2	Toxaphene	608	5.0	ND	G or C	1/5 YR

### BASE NEUTRAL EXTRACTABLES

83-32-9	Acenaphthene	625	10.0	<QL	G or C	1/5 YR
120-12-7	Anthracene	625	10.0	<QL	G or C	1/5 YR
92-87-5	Benzidine	(4)	(5)	<QL	G or C	1/5 YR
56-55-3	Benzo (a) anthracene	625	10.0	<QL	G or C	1/5 YR
205-99-2	Benzo (b) fluoranthene	625	10.0	<QL	G or C	1/5 YR
207-08-9	Benzo (k) fluoranthene	625	10.0	<QL	G or C	1/5 YR
50-32-8	Benzo (a) pyrene	625	10.0	<QL	G or C	1/5 YR
111-44-4	Bis 2-Chloroethyl Ether	(4)	(5)	<QL	G or C	1/5 YR
108-60-1	Bis 2-Chloroisopropyl Ether	(4)	(5)	<QL	G or C	1/5 YR
85-68-7	Butyl benzyl phthalate	625	10.0	<QL	G or C	1/5 YR
91-58-7	2-Choronaphthalene	(4)	(5)	<QL	G or C	1/5 YR
218-01-9	Chrysene	625	10.0	<QL	G or C	1/5 YR
53-70-3	Dibenz(a,h)anthracene	625	20.0	<QL	G or C	1/5 YR

CASRN#	CHEMICAL	EPA ANALYSIS NO.	QUANTIFICATION LEVEL <sup>(1)</sup>	REPORTING RESULTS	SAMPLE TYPE <sup>(2)</sup>	SAMPLE FREQUENCY
84-74-2	Dibutyl phthalate (synonym = Di-n-Butyl Phthalate)	625	10.0	<QL	G or C	1/5 YR
95-50-1	1,2-Dichlorobenzene	624	10.0	<QL	G or C	1/5 YR
541-73-1	1,3-Dichlorobenzene	624	10.0	<QL	G or C	1/5 YR
106-46-7	1,4-Dichlorobenzene	624	10.0	<QL	G or C	1/5 YR
91-94-1	3,3-Dichlorobenzidine	(4)	(5)	<QL	G or C	1/5 YR
84-66-2	Diethyl phthalate	625	10.0	<QL	G or C	1/5 YR
117-81-7	Bis-2-ethylhexyl phthalate	625	10.0	<QL	G or C	1/5 YR
131-11-3	Dimethyl phthalate	(4)	(5)	<QL	G or C	1/5 YR
121-14-2	2,4-Dinitrotoluene	625	10.0	<QL	G or C	1/5 YR
122-66-7	1,2-Diphenylhydrazine	(4)	(5)	<QL	G or C	1/5 YR
206-44-0	Fluoranthene	625	10.0	<QL	G or C	1/5 YR
86-73-7	Fluorene	625	10.0	<QL	G or C	1/5 YR
118-74-1	Hexachlorobenzene	(4)	(5)	<QL	G or C	1/5 YR
87-68-3	Hexachlorobutadiene	(4)	(5)	<QL	G or C	1/5 YR
77-47-4	Hexachlorocyclopentadiene	(4)	(5)	<QL	G or C	1/5 YR
67-72-1	Hexachloroethane	(4)	(5)	<QL	G or C	1/5 YR
193-39-5	Indeno(1,2,3-cd)pyrene	625	20.0	<QL	G or C	1/5 YR
78-59-1	Isophorone	625	10.0	<QL	G or C	1/5 YR
98-95-3	Nitrobenzene	625	10.0	<QL	G or C	1/5 YR
62-75-9	N-Nitrosodimethylamine	(4)	(5)	<QL	G or C	1/5 YR
621-64-7	N-Nitrosodi-n-propylamine	(4)	(5)	<QL	G or C	1/5 YR
86-30-6	N-Nitrosodiphenylamine	(4)	(5)	<QL	G or C	1/5 YR
129-00-0	Pyrene	625	10.0	<QL	G or C	1/5 YR
120-82-1	1,2,4-Trichlorobenzene	625	10.0	<QL	G or C	1/5 YR

## VOLATILES

107-02-8	Acrolein	(4)	(5)	<QL	G	1/5 YR
107-13-1	Acrylonitrile	(4)	(5)	<QL	G	1/5 YR
71-43-2	Benzene	624	10.0	<QL	G	1/5 YR
75-25-2	Bromoform	624	10.0	<QL	G	1/5 YR

CASRN#	CHEMICAL	EPA ANALYSIS NO.	QUANTIFICATION LEVEL <sup>(1)</sup>	REPORTING RESULTS	SAMPLE TYPE <sup>(2)</sup>	SAMPLE FREQUENCY
56-23-5	Carbon Tetrachloride	624	10.0	<QL	G	1/5 YR
108-90-7	Chlorobenzene (synonym = monochlorobenzene)	624	50.0	<QL	G	1/5 YR
124-48-1	Chlorodibromomethane	624	10.0	<QL	G	1/5 YR
67-66-3	Chloroform	624	10.0	<QL	G	1/5 YR
75-09-2	Dichloromethane (synonym = methylene chloride)	624	20.0	<QL	G	1/5 YR
75-27-4	Dichlorobromomethane	624	10.0	<QL	G	1/5 YR
107-06-2	1,2-Dichloroethane	624	10.0	<QL	G	1/5 YR
75-35-4	1,1-Dichloroethylene	624	10.0	<QL	G	1/5 YR
156-60-5	1,2-trans-dichloroethylene	(4)	(5)	<QL	G	1/5 YR
78-87-5	1,2-Dichloropropane	(4)	(5)	<QL	G	1/5 YR
542-75-6	1,3-Dichloropropene	(4)	(5)	<QL	G	1/5 YR
100-41-4	Ethylbenzene	624	10.0	<QL	G	1/5 YR
74-83-9	Methyl Bromide	(4)	(5)	<QL	G	1/5 YR
79-34-5	1,1,2,2-Tetrachloroethane	(4)	(5)	<QL	G	1/5 YR
127-18-4	Tetrachloroethylene	624	10.0	<QL	G	1/5 YR
10-88-3	Toluene	624	10.0	<QL	G	1/5 YR
79-00-5	1,1,2-Trichloroethane	(4)	(5)	<QL	G	1/5 YR
79-01-6	Trichloroethylene	624	10.0	<QL	G	1/5 YR
75-01-4	Vinyl Chloride	624	10.0	<QL	G	1/5 YR

### ACID EXTRACTABLES<sup>(6)</sup>

95-57-8	2-Chlorophenol	625	10.0	<QL	G or C	1/5 YR
120-83-2	2,4 Dichlorophenol	625	10.0	<QL	G or C	1/5 YR
105-67-9	2,4 Dimethylphenol	625	10.0	<QL	G or C	1/5 YR
51-28-5	2,4-Dinitrophenol	(4)	(5)	<QL	G or C	1/5 YR
534-52-1	2-Methyl-4,6-Dinitrophenol	(4)	(5)	<QL	G or C	1/5 YR
25154-52-3	Nonylphenol	(5)	(5)	<QL	G or C	1/5 YR
87-86-5	Pentachlorophenol	625	50.0	<QL	G or C	1/5 YR
108-95-2	Phenol	625	10.0	<QL	G or C	1/5 YR
88-06-2	2,4,6-Trichlorophenol	625	10.0	<QL	G or C	1/5 YR

CASRN#	CHEMICAL	EPA ANALYSIS NO.	QUANTIFICATION LEVEL <sup>(1)</sup>	REPORTING RESULTS	SAMPLE TYPE <sup>(2)</sup>	SAMPLE FREQUENCY
<b>MISCELLANEOUS</b>						
776-41-7	Ammonia as NH <sub>3</sub> -N	350.1	200	<QL	C	1/5 YR
7782-50-5	Chlorine, Total Residual	(4)	100	<QL	G	1/5 YR
57-12-5	Cyanide, Free	(4)	10.0	<QL	G	1/5 YR
N/A	<i>E. coli / Enterococcus</i> (N/CML)	(4)	(5)	<1.0	G	1/5 YR
7783-06-4	Hydrogen Sulfide	(5)	(5)	<QL	G	1/5 YR
60-10-5	Tributyltin <sup>(7)</sup>	NBSR 85-3295	(5)	<QL	G or C	1/5 YR
	Hardness (mg/L as CaCO <sub>3</sub> )	(4)	(5)	28.4	G or C (10)	1/5 YR

FOOTNOTES:

- (1) Quantification level (QL) is defined as the lowest concentration used for the calibration of a measurement system when the calibration is in accordance with the procedures published for the required method.

The quantification levels indicated for the metals are actually Specific Target Values developed for this permit. The Specific Target Value is the approximate value that may initiate a wasteload allocation analysis. Target values are not wasteload allocations or effluent limitations. The Specific Target Values are subject to change based on additional information such as hardness data, receiving stream flow, and design flows.

Units for the quantification level are micrograms/liter unless otherwise specified.

Quality control and quality assurance information shall be submitted to document that the required quantification level has been attained.

- (2) Sample Type

G = Grab = An individual sample collected in less than 15 minutes. Substances specified with "grab" sample type shall only be collected as grabs. The permittee may analyze multiple grabs and report the average results provided that the individual grab results are also reported. For grab metals samples, the individual samples shall be filtered and preserved immediately upon collection.

C = Composite = A 24-hour (**PW - Revise as required to require same composite duration as BOD<sub>5</sub>**) composite unless otherwise specified. The composite shall be a combination of individual samples, taken proportional to flow, obtained at hourly or smaller time intervals. The individual samples may be of equal volume for flows that do not vary by +/- 10 percent over a 24-hour period.

- (3) A specific analytical method is not specified; however a target value for each metal has been established. An appropriate method to meet the target value shall be selected from the following list of EPA methods (or any approved method presented in 40 CFR Part 136). If the test result is less than the method QL, a "<[QL]" shall be reported where the actual analytical test QL is substituted for [QL].

<u>Metal</u>	<u>Analytical Method</u>
Antimony	1638; 1639
Arsenic	1632
Chromium <sup>(8)</sup>	1639
Cadmium	1637; 1638; 1639; 1640
Chromium VI	1639

Copper	1638; 1640
Lead	1637; 1638; 1640
Mercury	1631
Nickel	1638; 1639; 1640
Selenium	1638; 1639
Silver	1638
Zinc	1638; 1639

- (4) Any approved method presented in 40 CFR Part 136.
- (5) The QL is at the discretion of the permittee. For any substances addressed in 40 CFR Part 136, the permittee shall use one of the approved methods in 40 CFR Part 136.
- (6) Testing for phenols requires continuous extraction.
- (7) Analytical Methods: NBSR 85-3295 or DEQ's approved analysis for Tributyltin may also be used [See A Manual for the Analysis of Butyltins in Environmental Systems by the Virginia Institute of Marine Science, dated November 1996].
- (8) Both Chromium III and Chromium VI may be measured by the total chromium analysis. If the result of the total chromium analysis is less than or equal to the lesser of the Chromium III or Chromium VI method QL, the results for both Chromium III and Chromium VI can be reported as "<[QL]", where the actual analytical test QL is substituted for [QL].
- (9) The lab may use SW846 Method 8270D provided the lab has an Initial Demonstration of Capability, has passed a PT for Kepone, and meets the acceptance criteria for Kepone as given in Method 8270D
- (10) The sample type for Hardness (as CaCO<sub>3</sub>) shall match the sample type selected for Dissolved Metals.

Application (EPA Form 2A) data

Parameter	Maximum Daily Value		Average Daily Value		
	Value	Units	Value	Units	No. Samples
pH (minimum)	6.4	S.U.			
pH (maximum)	8.2	S.U.			
Flow Rate	1.3	MGD	0.035	MGD	365 (daily- 1 year)
Temperature (Winter)	19	°C	12.2	NA	142
Temperature (Summer)	30	°C	23.7	NA	214

Pollutant	Maximum Daily Discharge		Average Daily Discharge		
	Conc.	Units	Conc.	Units	No. Samples
cBOD <sub>5</sub>	8.74	mg/L	2.13	mg/L	159
Fecal Coliform	2420*	N/100 ml	16.94	N/100 ml	156
TSS	4.80	mg/L	1.43	mg/L	12
Ammonia-N	5.70	mg/L	0.74	mg/L	27
TRC	<QL	mg/L	<QL	mg/L	3
Dissolved Oxygen	11.85	mg/L	8.83	mg/L	365
Total Kjeldahl Nitrogen	7.2	mg/L	1.15	mg/L	158
Nitrate plus Nitrite Nitrogen	6.84	mg/L	2.46	mg/L	24
Oil and Grease	<5.0	mg/L	<5.0	mg/L	3
Phosphorus (total)	0.15	mg/L	1.08	mg/L	24
TDS	513	mg/L	443	mg/L	3

\*Fecal coliform –A review of the DMR data shows that the max fecal coliform count reported was 220 N/100mL. All geometric mean values were below the 200 N/100mL monthly average permit limitation and the maximum geometric mean reported was 70 N/100mL. The facility has been in compliance with the bacteria permit limitations for the duration of the 2007-2012 permit term and is not considered to be contributing to bacteria impairments in the receiving waters.

Parameter	Quant	Avg	Quanti	Max	Conc	Avg	Conc	Min	Conc	Max	Due Date
FLOW (MGD)	0.303	0.347		NULL	NULL	NULL	NULL		NULL	NULL	10-Aug-07
FLOW (MGD)	0.328	0.432		NULL	NULL	NULL	NULL		NULL	NULL	10-Sep-07
FLOW (MGD)	0.321	0.394		NULL	NULL	NULL	NULL		NULL	NULL	10-Oct-07
FLOW (MGD)	0.296	0.356		NULL	NULL	NULL	NULL		NULL	NULL	10-Nov-07
FLOW (MGD)	0.294	0.345		NULL	NULL	NULL	NULL		NULL	NULL	10-Dec-07
FLOW (MGD)	0.303	0.347		NULL	NULL	NULL	NULL		NULL	NULL	10-Jan-08
FLOW (MGD)	0.316	0.363		NULL	NULL	NULL	NULL		NULL	NULL	10-Feb-08
FLOW (MGD)	0.309	0.423		NULL	NULL	NULL	NULL		NULL	NULL	10-Mar-08
FLOW (MGD)	0.308	0.386		NULL	NULL	NULL	NULL		NULL	NULL	10-Apr-08
FLOW (MGD)	0.332	0.409		NULL	NULL	NULL	NULL		NULL	NULL	10-May-08
FLOW (MGD)	0.370	0.685		NULL	NULL	NULL	NULL		NULL	NULL	10-Jun-08
FLOW (MGD)	0.304	0.377		NULL	NULL	NULL	NULL		NULL	NULL	10-Jul-08
FLOW (MGD)	0.287	0.371		NULL	NULL	NULL	NULL		NULL	NULL	10-Aug-08
FLOW (MGD)	0.274	0.391		NULL	NULL	NULL	NULL		NULL	NULL	10-Sep-08
FLOW (MGD)	0.293	0.386		NULL	NULL	NULL	NULL		NULL	NULL	10-Oct-08
FLOW (MGD)	0.278	0.313		NULL	NULL	NULL	NULL		NULL	NULL	10-Nov-08
FLOW (MGD)	0.283	0.362		NULL	NULL	NULL	NULL		NULL	NULL	10-Dec-08
FLOW (MGD)	0.326	0.479		NULL	NULL	NULL	NULL		NULL	NULL	10-Jan-09
FLOW (MGD)	0.294	0.331		NULL	NULL	NULL	NULL		NULL	NULL	10-Feb-09
FLOW (MGD)	0.283	0.344		NULL	NULL	NULL	NULL		NULL	NULL	10-Mar-09
FLOW (MGD)	0.318	0.425		NULL	NULL	NULL	NULL		NULL	NULL	10-Apr-09
FLOW (MGD)	0.310	0.405		NULL	NULL	NULL	NULL		NULL	NULL	10-May-09
FLOW (MGD)	0.307	0.389		NULL	NULL	NULL	NULL		NULL	NULL	10-Jun-09
FLOW (MGD)	0.333	0.476		NULL	NULL	NULL	NULL		NULL	NULL	10-Jul-09
FLOW (MGD)	0.280	0.340		NULL	NULL	NULL	NULL		NULL	NULL	10-Aug-09
FLOW (MGD)	0.371	1.000		NULL	NULL	NULL	NULL		NULL	NULL	10-Sep-09
FLOW (MGD)	0.354	0.637		NULL	NULL	NULL	NULL		NULL	NULL	10-Oct-09
FLOW (MGD)	0.321	0.460		NULL	NULL	NULL	NULL		NULL	NULL	10-Nov-09
FLOW (MGD)	0.541	1.042		NULL	NULL	NULL	NULL		NULL	NULL	10-Dec-09
FLOW (MGD)	0.627	1.000		NULL	NULL	NULL	NULL		NULL	NULL	10-Jan-10
FLOW (MGD)	0.560	0.970		NULL	NULL	NULL	NULL		NULL	NULL	10-Feb-10
FLOW (MGD)	0.725	0.946		NULL	NULL	NULL	NULL		NULL	NULL	10-Mar-10
FLOW (MGD)	0.650	0.788		NULL	NULL	NULL	NULL		NULL	NULL	10-Apr-10
FLOW (MGD)	0.458	0.609		NULL	NULL	NULL	NULL		NULL	NULL	10-May-10
FLOW (MGD)	0.377	0.520		NULL	NULL	NULL	NULL		NULL	NULL	10-Jun-10
FLOW (MGD)	0.486	0.588		NULL	NULL	NULL	NULL		NULL	NULL	10-Jul-10
FLOW (MGD)	0.409	0.544		NULL	NULL	NULL	NULL		NULL	NULL	10-Aug-10
FLOW (MGD)	0.465	0.569		NULL	NULL	NULL	NULL		NULL	NULL	10-Sep-10
FLOW (MGD)	0.456	0.994		NULL	NULL	NULL	NULL		NULL	NULL	10-Oct-10
FLOW (MGD)	0.449	0.865		NULL	NULL	NULL	NULL		NULL	NULL	10-Nov-10
FLOW (MGD)	.425	.599		NULL	NULL	NULL	NULL		NULL	NULL	10-Dec-10
FLOW (MGD)	0.291	0.406		NULL	NULL	NULL	NULL		NULL	NULL	10-Jan-11
FLOW (MGD)	0.315	0.428		NULL	NULL	NULL	NULL		NULL	NULL	10-Feb-11
FLOW (MGD)	0.299	0.351		NULL	NULL	NULL	NULL		NULL	NULL	10-Mar-11
FLOW (MGD)	.316	.541		NULL	NULL	NULL	NULL		NULL	NULL	10-Apr-11
FLOW (MGD)	.322	.412		NULL	NULL	NULL	NULL		NULL	NULL	10-May-11
FLOW (MGD)	.314	.402		NULL	NULL	NULL	NULL		NULL	NULL	10-Jun-11
FLOW (MGD)	.301	.448		NULL	NULL	NULL	NULL		NULL	NULL	10-Jul-11
FLOW (MGD)	.307	.420		NULL	NULL	NULL	NULL		NULL	NULL	10-Aug-11
FLOW (MGD)	.381	.880		NULL	NULL	NULL	NULL		NULL	NULL	10-Sep-11
FLOW (MGD)	.530	1.302		NULL	NULL	NULL	NULL		NULL	NULL	10-Oct-11

Parameter	Quant	Avg	Quanti	Max	Conc	Avg	Conc Min	Conc Max	Due Date
FLOW (MGD)	.358	.440	NULL	NULL	NULL	NULL	NULL	NULL	10-Nov-11
PH (SU)	NULL	NULL	NULL	6.6		7.90		10-Aug-07	
PH (SU)	NULL	NULL	NULL	6.8		7.9		10-Sep-07	
PH (SU)	NULL	NULL	NULL	7.0		7.80		10-Oct-07	
PH (SU)	NULL	NULL	NULL	6.9		8.10		10-Nov-07	
PH (SU)	NULL	NULL	NULL	6.9		7.80		10-Dec-07	
PH (SU)	NULL	NULL	NULL	6.8		7.90		10-Jan-08	
PH (SU)	NULL	NULL	NULL	6.8		7.80		10-Feb-08	
PH (SU)	NULL	NULL	NULL	6.5		7.70		10-Mar-08	
PH (SU)	NULL	NULL	NULL	6.6		7.50		10-Apr-08	
PH (SU)	NULL	NULL	NULL	6.1		7.60		10-May-08	
PH (SU)	NULL	NULL	NULL	6.7		7.70		10-Jun-08	
PH (SU)	NULL	NULL	NULL	6.9		7.90		10-Jul-08	
PH (SU)	NULL	NULL	NULL	7.0		8.00		10-Aug-08	
PH (SU)	NULL	NULL	NULL	7.0		8.00		10-Sep-08	
PH (SU)	NULL	NULL	NULL	7.1		7.70		10-Oct-08	
PH (SU)	NULL	NULL	NULL	7.0		7.80		10-Nov-08	
PH (SU)	NULL	NULL	NULL	6.9		7.70		10-Dec-08	
PH (SU)	NULL	NULL	NULL	6.7		7.80		10-Jan-09	
PH (SU)	NULL	NULL	NULL	6.8		8.00		10-Feb-09	
PH (SU)	NULL	NULL	NULL	6.9		7.80		10-Mar-09	
PH (SU)	NULL	NULL	NULL	7.3		8.20		10-Apr-09	
PH (SU)	NULL	NULL	NULL	7.4		7.90		10-May-09	
PH (SU)	NULL	NULL	NULL	7.6		8.10		10-Jun-09	
PH (SU)	NULL	NULL	NULL	7.8		8.30		10-Jul-09	
PH (SU)	NULL	NULL	NULL	7.9		8.20		10-Aug-09	
PH (SU)	NULL	NULL	NULL	7.4		8.10		10-Sep-09	
PH (SU)	NULL	NULL	NULL	7.4		8.00		10-Oct-09	
PH (SU)	NULL	NULL	NULL	7.3		8.00		10-Nov-09	
PH (SU)	NULL	NULL	NULL	6.9		7.80		10-Dec-09	
PH (SU)	NULL	NULL	NULL	7.0		7.60		10-Jan-10	
PH (SU)	NULL	NULL	NULL	7.0		7.90		10-Feb-10	
PH (SU)	NULL	NULL	NULL	6.7		8.20		10-Mar-10	
PH (SU)	NULL	NULL	NULL	6.9		7.80		10-Apr-10	
PH (SU)	NULL	NULL	NULL	7.1		8.20		10-May-10	
PH (SU)	NULL	NULL	NULL	7.2		8.20		10-Jun-10	
PH (SU)	NULL	NULL	NULL	7.4		8.50		10-Jul-10	
PH (SU)	NULL	NULL	NULL	7.3		8.50		10-Aug-10	
PH (SU)	NULL	NULL	NULL	7.4		8.70		10-Sep-10	
PH (SU)	NULL	NULL	NULL	7.1		8.10		10-Oct-10	
PH (SU)	NULL	NULL	NULL	7.4		8.20		10-Nov-10	
PH (SU)	NULL	NULL	NULL	7.6		8.20		10-Dec-10	
PH (SU)	NULL	NULL	NULL	7.2		8.20		10-Jan-11	
PH (SU)	NULL	NULL	NULL	6.4		7.80		10-Feb-11	
PH (SU)	NULL	NULL	NULL	7.3		7.90		10-Mar-11	
PH (SU)	NULL	NULL	NULL	6.9		8.00		10-Apr-11	
PH (SU)	NULL	NULL	NULL	7.2		8.10		10-May-11	
PH (SU)	NULL	NULL	NULL	7.4		8.00		10-Jun-11	
PH (SU)	NULL	NULL	NULL	7.1		7.70		10-Jul-11	
PH (SU)	NULL	NULL	NULL	7.3		7.80		10-Aug-11	
PH (SU)	NULL	NULL	NULL	7		7.80		10-Sep-11	

Parameter	Quant	Avg	Quanti	Max	Conc	Avg	Conc Min	Conc Max	Due Date
PH (SU)	NULL	NULL	NULL	7.1		7.80		7.80	10-Oct-11
PH (SU)	NULL	NULL	NULL	7.2		7.80		7.80	10-Nov-11
PH (SU)						8.20	<b>90th % max</b>		
PH (SU)						7.70	<b>10th % max</b>		
TSS (mg/L) (kg/d)	14	14	11	NULL	11				10-Aug-07
TSS (mg/L) (kg/d)	7	7	6	NULL	6				10-Sep-07
TSS (mg/L) (kg/d)	6	6	6	NULL	6				10-Oct-07
TSS (mg/L) (kg/d)	11	11	10	NULL	10				10-Nov-07
TSS (mg/L) (kg/d)	5	5	5	NULL	5				10-Dec-07
TSS (mg/L) (kg/d)	10	10	8	NULL	8				10-Jan-08
TSS (mg/L) (kg/d)	6	6	5	NULL	5				10-Feb-08
TSS (mg/L) (kg/d)	7	7	6	NULL	6				10-Mar-08
TSS (mg/L) (kg/d)	3	3	3	NULL	3				10-Apr-08
TSS (mg/L) (kg/d)	10	10	6	NULL	6				10-May-08
TSS (mg/L) (kg/d)	32	32	12	NULL	12				10-Jun-08
TSS (mg/L) (kg/d)	4	4	3	NULL	3				10-Jul-08
TSS (mg/L) (kg/d)	3	3	3	NULL	3				10-Aug-08
TSS (mg/L) (kg/d)	3	3	4	NULL	4				10-Sep-08
TSS (mg/L) (kg/d)	5	5	4	NULL	4				10-Oct-08
TSS (mg/L) (kg/d)	3	3	3	NULL	3				10-Nov-08
TSS (mg/L) (kg/d)	5	5	5	NULL	5				10-Dec-08
TSS (mg/L) (kg/d)	6	6	5	NULL	5				10-Jan-09
TSS (mg/L) (kg/d)	7	7	6	NULL	6				10-Feb-09
TSS (mg/L) (kg/d)	12	12	10	NULL	10				10-Mar-09
TSS (mg/L) (kg/d)	9	9	6	NULL	6				10-Apr-09
TSS (mg/L) (kg/d)	11	11	10	NULL	10				10-May-09
TSS (mg/L) (kg/d)	3	3	2	NULL	2				10-Jun-09
TSS (mg/L) (kg/d)	4	4	4	NULL	4				10-Jul-09
TSS (mg/L) (kg/d)	8	8	7	NULL	7				10-Aug-09
TSS (mg/L) (kg/d)	6	6	6	NULL	6				10-Sep-09
TSS (mg/L) (kg/d)	13	13	10	NULL	10				10-Oct-09
TSS (mg/L) (kg/d)	3	3	2	NULL	2				10-Nov-09
TSS (mg/L) (kg/d)	10	10	6.0	NULL	6.0				10-Dec-09
TSS (mg/L) (kg/d)	9	9	4	NULL	4				10-Jan-10
TSS (mg/L) (kg/d)	8	8	4	NULL	4				10-Feb-10
TSS (mg/L) (kg/d)	24	24	9	NULL	9				10-Mar-10
TSS (mg/L) (kg/d)	18	18	7	NULL	7				10-Apr-10
TSS (mg/L) (kg/d)	3	3	2	NULL	2				10-May-10
TSS (mg/L) (kg/d)	<QL	<QL	<QL	NULL	<QL				10-Jun-10
TSS (mg/L) (kg/d)	5	5	2	NULL	2				10-Jul-10
TSS (mg/L) (kg/d)	2	2	1	NULL	1				10-Aug-10
TSS (mg/L) (kg/d)	<QL	<QL	<QL	NULL	<QL				10-Sep-10
TSS (mg/L) (kg/d)	<QL	<QL	<QL	NULL	<QL				10-Oct-10
TSS (mg/L) (kg/d)	<QL	<QL	<QL	NULL	<QL				10-Nov-10
TSS (mg/L) (kg/d)	<QL	<QL	<QL	NULL	<QL				10-Dec-10
TSS (mg/L) (kg/d)	<QL	<QL	<QL	NULL	<QL				10-Jan-11
TSS (mg/L) (kg/d)	2	2	2	NULL	2				10-Feb-11
TSS (mg/L) (kg/d)	6	6	5	NULL	5				10-Mar-11
TSS (mg/L) (kg/d)	2	2	1	NULL	1				10-Apr-11
TSS (mg/L) (kg/d)	<QL	<QL	<QL	NULL	<QL				10-May-11
TSS (mg/L) (kg/d)	<QL	<QL	<QL	NULL	<QL				10-Jun-11

Parameter	Quant	Avg	Quanti	Max	Conc	Avg	Conc Min	Conc Max	Due Date
TSS (mg/L) (kg/d)	<QL	<QL	<QL	NULL	<QL				10-Jul-11
TSS (mg/L) (kg/d)	<QL	<QL	<QL	NULL	<QL				10-Aug-11
TSS (mg/L) (kg/d)	2	2	2	NULL	2				10-Sep-11
TSS (mg/L) (kg/d)	3	3	1	NULL	1				10-Oct-11
TSS (mg/L) (kg/d)	<QL	<QL	<QL	NULL	<QL				10-Nov-11
Fecal coliform (N/100mL)	NULL	NULL	8	NULL	70				10-Aug-07
Fecal coliform (N/100mL)	NULL	NULL	4	NULL	170				10-Sep-07
Fecal coliform (N/100mL)	NULL	NULL	3	NULL	13				10-Oct-07
Fecal coliform (N/100mL)	NULL	NULL	8	NULL	33				10-Nov-07
Fecal coliform (N/100mL)	NULL	NULL	40	NULL	170				10-Dec-07
Fecal coliform (N/100mL)	NULL	NULL	7	NULL	49				10-Jan-08
Fecal coliform (N/100mL)	NULL	NULL	3	NULL	49				10-Feb-08
Fecal coliform (N/100mL)	NULL	NULL	5	NULL	220				10-Mar-08
Fecal coliform (N/100mL)	NULL	NULL	9	NULL	33				10-Apr-08
Fecal coliform (N/100mL)	NULL	NULL	9	NULL	110				10-May-08
Fecal coliform (N/100mL)	NULL	NULL	4	NULL	17				10-Jun-08
DO (mg/L)	NULL	NULL	NULL	7.3	NULL				10-Aug-07
DO (mg/L)	NULL	NULL	NULL	6.2	NULL				10-Sep-07
DO (mg/L)	NULL	NULL	NULL	7.1	NULL				10-Oct-07
DO (mg/L)	NULL	NULL	NULL	5.4	NULL				10-Nov-07
DO (mg/L)	NULL	NULL	NULL	9.2	NULL				10-Dec-07
DO (mg/L)	NULL	NULL	NULL	10.3	NULL				10-Jan-08
DO (mg/L)	NULL	NULL	NULL	10.2	NULL				10-Feb-08
DO (mg/L)	NULL	NULL	NULL	9.9	NULL				10-Mar-08
DO (mg/L)	NULL	NULL	NULL	8.9	NULL				10-Apr-08
DO (mg/L)	NULL	NULL	NULL	9.0	NULL				10-May-08
DO (mg/L)	NULL	NULL	NULL	8.3	NULL				10-Jun-08
DO (mg/L)	NULL	NULL	NULL	7.6	NULL				10-Jul-08
DO (mg/L)	NULL	NULL	NULL	7.1	NULL				10-Aug-08
DO (mg/L)	NULL	NULL	NULL	7.1	NULL				10-Sep-08
DO (mg/L)	NULL	NULL	NULL	7.7	NULL				10-Oct-08
DO (mg/L)	NULL	NULL	NULL	8.0	NULL				10-Nov-08
DO (mg/L)	NULL	NULL	NULL	9.5	NULL				10-Dec-08
DO (mg/L)	NULL	NULL	NULL	9.1	NULL				10-Jan-09
DO (mg/L)	NULL	NULL	NULL	10.0	NULL				10-Feb-09
DO (mg/L)	NULL	NULL	NULL	10.3	NULL				10-Mar-09
DO (mg/L)	NULL	NULL	NULL	10.1	NULL				10-Apr-09
DO (mg/L)	NULL	NULL	NULL	8.8	NULL				10-May-09
DO (mg/L)	NULL	NULL	NULL	7.2	NULL				10-Jun-09
DO (mg/L)	NULL	NULL	NULL	5.9	NULL				10-Jul-09
DO (mg/L)	NULL	NULL	NULL	7.1	NULL				10-Aug-09
DO (mg/L)	NULL	NULL	NULL	7.3	NULL				10-Sep-09
DO (mg/L)	NULL	NULL	NULL	6.3	NULL				10-Oct-09
DO (mg/L)	NULL	NULL	NULL	7.1	NULL				10-Nov-09
DO (mg/L)	NULL	NULL	NULL	7.1	NULL				10-Dec-09
DO (mg/L)	NULL	NULL	NULL	9.3	NULL				10-Jan-10
DO (mg/L)	NULL	NULL	NULL	8.8	NULL				10-Feb-10
DO (mg/L)	NULL	NULL	NULL	9.1	NULL				10-Mar-10
DO (mg/L)	NULL	NULL	NULL	9.1	NULL				10-Apr-10
DO (mg/L)	NULL	NULL	NULL	8.4	NULL				10-May-10
DO (mg/L)	NULL	NULL	NULL	6.2	NULL				10-Jun-10

Parameter	Quant	Avg	Quanti	Max	Conc	Avg	Conc	Min	Conc	Max	Due Date
DO (mg/L)	NULL	NULL	NULL	6.4	NULL						10-Jul-10
DO (mg/L)	NULL	NULL	NULL	6.6	NULL						10-Aug-10
DO (mg/L)	NULL	NULL	NULL	7.2	NULL						10-Sep-10
DO (mg/L)	NULL	NULL	NULL	7.4	NULL						10-Oct-10
DO (mg/L)	NULL	NULL	NULL	7.8	NULL						10-Nov-10
DO (mg/L)	NULL	NULL	NULL	7.2	NULL						10-Dec-10
DO (mg/L)	NULL	NULL	NULL	8	NULL						10-Jan-11
DO (mg/L)	NULL	NULL	NULL	9.9	NULL						10-Feb-11
DO (mg/L)	NULL	NULL	NULL	8.0	NULL						10-Mar-11
DO (mg/L)	NULL	NULL	NULL	9.3	NULL						10-Apr-11
DO (mg/L)	NULL	NULL	NULL	8.2	NULL						10-May-11
DO (mg/L)	NULL	NULL	NULL	7.4	NULL						10-Jun-11
DO (mg/L)	NULL	NULL	NULL	6.8	NULL						10-Jul-11
DO (mg/L)	NULL	NULL	NULL	6.6	NULL						10-Aug-11
DO (mg/L)	NULL	NULL	NULL	6.3	NULL						10-Sep-11
DO (mg/L)	NULL	NULL	NULL	6.8	NULL						10-Oct-11
DO (mg/L)	NULL	NULL	NULL	7.9	NULL						10-Nov-11
TP (g/d) (mg/L)	2861	NULL	2.7	NULL	NULL						10-Aug-07
TP (g/d) (mg/L)	2400	NULL	2.0	NULL	NULL						10-Sep-07
TP (g/d) (mg/L)	1495	NULL	1.2	NULL	NULL						10-Oct-07
TP (g/d) (mg/L)	1440	NULL	1.2	NULL	NULL						10-Nov-07
TP (g/d) (mg/L)	898	NULL	0.8	NULL	NULL						10-Dec-07
TP (g/d) (mg/L)	721	NULL	0.6	NULL	NULL						10-Jan-08
TP (g/d) (mg/L)	455	NULL	0.4	NULL	NULL						10-Feb-08
TP (g/d) (mg/L)	353	NULL	0.4	NULL	NULL						10-Mar-08
TP (g/d) (mg/L)	706	NULL	0.6	NULL	NULL						10-Apr-08
TP (g/d) (mg/L)	1139	NULL	0.7	NULL	NULL						10-May-08
TP (g/d) (mg/L)	1287	NULL	0.9	NULL	NULL						10-Jun-08
TP (g/d) (mg/L)	1516	NULL	1.3	NULL	NULL						10-Jul-08
TP (g/d) (mg/L)	1314	NULL	1.2	NULL	NULL						10-Aug-08
TP (g/d) (mg/L)	1325	NULL	1.3	NULL	NULL						10-Sep-08
TP (g/d) (mg/L)	1425	NULL	1.3	NULL	NULL						10-Oct-08
TP (g/d) (mg/L)	1024	NULL	1.1	NULL	NULL						10-Nov-08
TP (g/d) (mg/L)	1093	NULL	1.0	NULL	NULL						10-Dec-08
TP (g/d) (mg/L)	779	NULL	0.7	NULL	NULL						10-Jan-09
TP (g/d) (mg/L)	708	NULL	0.6	NULL	NULL						10-Feb-09
TP (g/d) (mg/L)	1337	NULL	1.3	NULL	NULL						10-Mar-09
TP (g/d) (mg/L)	1761	NULL	1.3	NULL	NULL						10-Apr-09
TP (g/d) (mg/L)	1833	NULL	1.5	NULL	NULL						10-May-09
TP (g/d) (mg/L)	2657	NULL	2.4	NULL	NULL						10-Jun-09
TP (g/d) (mg/L)	1288	NULL	1.0	NULL	NULL						10-Jul-09
TP (g/d) (mg/L)	2774	NULL	2.5	NULL	NULL						10-Aug-09
TP (g/d) (mg/L)	1658	NULL	1.5	NULL	NULL						10-Sep-09
TP (g/d) (mg/L)	1940	NULL	1.6	NULL	NULL						10-Oct-09
TP (g/d) (mg/L)	1582	NULL	1.4	NULL	NULL						10-Nov-09
TP (g/d) (mg/L)	1272	NULL	0.9	NULL	NULL						10-Dec-09
TP (g/d) (mg/L)	762	NULL	0.4	NULL	NULL						10-Jan-10
TP (g/d) (mg/L)	945	NULL	0.3	NULL	NULL						10-Feb-10
TP (g/d) (mg/L)	1758	NULL	0.6	NULL	NULL						10-Mar-10
TP (g/d) (mg/L)	1984	NULL	0.8	NULL	NULL						10-Apr-10
TP (g/d) (mg/L)	1858	NULL	1.1	NULL	NULL						10-May-10

Parameter	Quant	Avg	Quanti	Max	Conc	Avg	Conc Min	Conc Max	Due Date
TP (g/d) (mg/L)	1987	NULL	1.3	NULL	NULL	NULL	NULL	NULL	10-Jun-10
TP (g/d) (mg/L)	654	NULL	0.3	NULL	NULL	NULL	NULL	NULL	10-Jul-10
TP (g/d) (mg/L)	1612	NULL	1.1	NULL	NULL	NULL	NULL	NULL	10-Aug-10
TP (g/d) (mg/L)	333	NULL	0.2	NULL	NULL	NULL	NULL	NULL	10-Sep-10
TP (g/d) (mg/L)	511	NULL	0.3	NULL	NULL	NULL	NULL	NULL	10-Oct-10
TP (g/d) (mg/L)	328	NULL	0.2	NULL	NULL	NULL	NULL	NULL	10-Nov-10
TP (g/d) (mg/L)	337	NULL	0.2	NULL	NULL	NULL	NULL	NULL	10-Dec-10
TP (g/d) (mg/L)	244	NULL	.2	NULL	NULL	NULL	NULL	NULL	10-Jan-11
TKN (g/d) (mg/L)	1719	1893	3.0	NULL	4.5	NULL	4.5	NULL	10-Aug-07
TKN (g/d) (mg/L)	1800	2000	3.0	NULL	4.5	NULL	4.5	NULL	10-Sep-07
TKN (g/d) (mg/L)	1850	1908	1.5	NULL	1.6	NULL	1.6	NULL	10-Oct-07
TKN (g/d) (mg/L)	2026	2160	1.8	NULL	2.0	NULL	2.0	NULL	10-Nov-07
TKN (g/d) (mg/L)	2057	2185	1.9	NULL	2.0	NULL	2.0	NULL	10-Dec-07
TKN (g/d) (mg/L)	2019	2402	1.8	NULL	2.2	NULL	2.2	NULL	10-Jan-08
TKN (g/d) (mg/L)	1810	1971	1.5	NULL	1.6	NULL	1.6	NULL	10-Feb-08
TKN (g/d) (mg/L)	1698	1968	1.5	NULL	1.6	NULL	1.6	NULL	10-Mar-08
TKN (g/d) (mg/L)	1770	1828	1.6	NULL	2.0	NULL	2.0	NULL	10-Apr-08
TKN (g/d) (mg/L)	2165	2603	1.7	NULL	1.9	NULL	1.9	NULL	10-May-08
TKN (g/d) (mg/L)	2273	3060	1.6	NULL	1.8	NULL	1.8	NULL	10-Jun-08
TKN (g/d) (mg/L)	1722	2116	1.5	NULL	1.7	NULL	1.7	NULL	10-Jul-08
TKN (g/d) (mg/L)	3627	10662	1.6	NULL	1.9	NULL	1.9	NULL	10-Aug-08
TKN (g/d) (mg/L)	1476	1750	1.5	NULL	1.7	NULL	1.7	NULL	10-Sep-08
TKN (g/d) (mg/L)	1613	1646	1.5	NULL	1.7	NULL	1.7	NULL	10-Oct-08
TKN (g/d) (mg/L)	1404	1517	1.4	NULL	1.4	NULL	1.4	NULL	10-Nov-08
TKN (g/d) (mg/L)	1655	1774	1.6	NULL	1.8	NULL	1.8	NULL	10-Dec-08
TKN (g/d) (mg/L)	2450	3065	2.0	NULL	2.6	NULL	2.6	NULL	10-Jan-09
TKN (g/d) (mg/L)	2266	2379	3.0	NULL	4.5	NULL	4.5	NULL	10-Feb-09
TKN (g/d) (mg/L)	3228	3648	3.1	NULL	3.4	NULL	3.4	NULL	10-Mar-09
TKN (g/d) (mg/L)	2737	3292	2.4	NULL	2.8	NULL	2.8	NULL	10-Apr-09
TKN (g/d) (mg/L)	3387	5864	2.8	NULL	4.6	NULL	4.6	NULL	10-May-09
TKN (g/d) (mg/L)	2205	3119	1.9	NULL	2.6	NULL	2.6	NULL	10-Jun-09
TKN (g/d) (mg/L)	1781	1946	1.5	NULL	1.7	NULL	1.7	NULL	10-Jul-09
TKN (g/d) (mg/L)	1772	2056	1.6	NULL	1.9	NULL	1.9	NULL	10-Aug-09
TKN (g/d) (mg/L)	1863	1980	1.5	NULL	1.7	NULL	1.7	NULL	10-Sep-09
TKN (g/d) (mg/L)	2795	5559	1.9	NULL	2.9	NULL	2.9	NULL	10-Oct-09
TKN (g/d) (mg/L)	2137	2972	1.8	NULL	2.0	NULL	2.0	NULL	10-Nov-09
TKN (g/d) (mg/L)	4861	8171	2.6	NULL	4.0	NULL	4.0	NULL	10-Dec-09
TKN (g/d) (mg/L)	2245	2641	1.0	NULL	1.1	NULL	1.1	NULL	10-Jan-10
TKN (g/d) (mg/L)	2601	4490	1.2	NULL	1.3	NULL	1.3	NULL	10-Feb-10
TKN (g/d) (mg/L)	6953	8480	2.3	NULL	2.9	NULL	2.9	NULL	10-Mar-10
TKN (g/d) (mg/L)	3932	4321	1.6	NULL	1.8	NULL	1.8	NULL	10-Apr-10
TKN (g/d) (mg/L)	2054	2465	1.3	NULL	1.3	NULL	1.3	NULL	10-May-10
TKN (g/d) (mg/L)	1973	2169	1.4	NULL	1.5	NULL	1.5	NULL	10-Jun-10
TKN (g/d) (mg/L)	1941	2353	1.1	NULL	1.2	NULL	1.2	NULL	10-Jul-10
TKN (g/d) (mg/L)	1745	2678	1.2	NULL	1.6	NULL	1.6	NULL	10-Aug-10
TKN (g/d) (mg/L)	1588	1694	0.9	NULL	1.0	NULL	1.0	NULL	10-Sep-10
TKN (g/d) (mg/L)	1859	2173	1.1	NULL	1.2	NULL	1.2	NULL	10-Oct-10
TKN (g/d) (mg/L)	1414	2142	0.9	NULL	1.1	NULL	1.1	NULL	10-Nov-10
TKN (g/d) (mg/L)	3478	2636	2.0	NULL	2.1	NULL	2.1	NULL	10-Dec-10
TKN (g/d) (mg/L)	1326	2820	1.2	NULL	2.4	NULL	2.4	NULL	10-Jan-11
TKN (g/d) (mg/L)	1692	2067	1.5	NULL	2.0	NULL	2.0	NULL	10-Feb-11

Parameter	Quant	Avg	Quanti	Max	Conc	Avg	Conc Min	Conc Max	Due Date
TKN (g/d) (mg/L)	1373	1529	1.3	NULL	1.3	1.3	1.3	1.3	10-Mar-11
TKN (g/d) (mg/L)	1162	1610	1	NULL	1.2	1.2	1.2	1.2	10-Apr-11
TKN (g/d) (mg/L)	2047	3772	1.7	NULL	3.3	3.3	3.3	3.3	10-May-11
TKN (g/d) (mg/L)	1214	1348	1.0	NULL	1.0	1.0	1.0	1.0	10-Jun-11
TKN (g/d) (mg/L)	1184	1543	1	NULL	1.2	1.2	1.2	1.2	10-Jul-11
TKN (g/d) (mg/L)	1124	1313	1.0	NULL	1.1	1.1	1.1	1.1	10-Aug-11
TKN (g/d) (mg/L)	1132	1372	.8	NULL	.9	.9	.9	.9	10-Sep-11
TKN (g/d) (mg/L)	1129	1323	0.6	NULL	0.6	0.6	0.6	0.6	10-Oct-11
TKN (g/d) (mg/L)	1076	1241	0.8	NULL	0.9	0.9	0.9	0.9	10-Nov-11
Enterococci (N/100mL)	NULL	NULL	1.2	NULL	NULL	NULL	NULL	NULL	10-Jul-08
Enterococci (N/100mL)	NULL	NULL	2	NULL	NULL	NULL	NULL	NULL	10-Aug-08
Enterococci (N/100mL)	NULL	NULL	2	NULL	NULL	NULL	NULL	NULL	10-Sep-08
Enterococci (N/100mL)	NULL	NULL	2	NULL	NULL	NULL	NULL	NULL	10-Oct-08
Enterococci (N/100mL)	NULL	NULL	15	NULL	NULL	NULL	NULL	NULL	10-Nov-08
Enterococci (N/100mL)	NULL	NULL	2	NULL	NULL	NULL	NULL	NULL	10-Dec-08
Enterococci (N/100mL)	NULL	NULL	2	NULL	NULL	NULL	NULL	NULL	10-Jan-09
Enterococci (N/100mL)	NULL	NULL	2	NULL	NULL	NULL	NULL	NULL	10-Feb-09
Enterococci (N/100mL)	NULL	NULL	5	NULL	NULL	NULL	NULL	NULL	10-Mar-09
Enterococci (N/100mL)	NULL	NULL	4	NULL	NULL	NULL	NULL	NULL	10-Apr-09
Enterococci (N/100mL)	NULL	NULL	2	NULL	NULL	NULL	NULL	NULL	10-May-09
Enterococci (N/100mL)	NULL	NULL	1	NULL	NULL	NULL	NULL	NULL	10-Jun-09
Enterococci (N/100mL)	NULL	NULL	4	NULL	NULL	NULL	NULL	NULL	10-Jul-09
Enterococci (N/100mL)	NULL	NULL	14	NULL	NULL	NULL	NULL	NULL	10-Aug-09
Enterococci (N/100mL)	NULL	NULL	16	NULL	NULL	NULL	NULL	NULL	10-Sep-09
Enterococci (N/100mL)	NULL	NULL	4	NULL	NULL	NULL	NULL	NULL	10-Oct-09
Enterococci (N/100mL)	NULL	NULL	4	NULL	NULL	NULL	NULL	NULL	10-Nov-09
Enterococci (N/100mL)	NULL	NULL	7	NULL	NULL	NULL	NULL	NULL	10-Dec-09
Enterococci (N/100mL)	NULL	NULL	1	NULL	NULL	NULL	NULL	NULL	10-Jan-10
Enterococci (N/100mL)	NULL	NULL	3	NULL	NULL	NULL	NULL	NULL	10-Feb-10
Enterococci (N/100mL)	NULL	NULL	6	NULL	NULL	NULL	NULL	NULL	10-Mar-10
Enterococci (N/100mL)	NULL	NULL	1	NULL	NULL	NULL	NULL	NULL	10-Apr-10
Enterococci (N/100mL)	NULL	NULL	1	NULL	NULL	NULL	NULL	NULL	10-May-10
Enterococci (N/100mL)	NULL	NULL	2	NULL	NULL	NULL	NULL	NULL	10-Jun-10
Enterococci (N/100mL)	NULL	NULL	1	NULL	NULL	NULL	NULL	NULL	10-Jul-10
Enterococci (N/100mL)	NULL	NULL	1	NULL	NULL	NULL	NULL	NULL	10-Aug-10
Enterococci (N/100mL)	NULL	NULL	1	NULL	NULL	NULL	NULL	NULL	10-Sep-10
Enterococci (N/100mL)	NULL	NULL	1	NULL	NULL	NULL	NULL	NULL	10-Oct-10
Enterococci (N/100mL)	NULL	NULL	1	NULL	NULL	NULL	NULL	NULL	10-Nov-10
Enterococci (N/100mL)	NULL	NULL	2	NULL	NULL	NULL	NULL	NULL	10-Dec-10
Enterococci (N/100mL)	NULL	NULL	3	NULL	NULL	NULL	NULL	NULL	10-Jan-11
Enterococci (N/100mL)	NULL	NULL	2	NULL	NULL	NULL	NULL	NULL	10-Feb-11
Enterococci (N/100mL)	NULL	NULL	1	NULL	NULL	NULL	NULL	NULL	10-Mar-11
Enterococci (N/100mL)	NULL	NULL	1	NULL	NULL	NULL	NULL	NULL	10-Apr-11
Enterococci (N/100mL)	NULL	NULL	1	NULL	NULL	NULL	NULL	NULL	10-May-11
Enterococci (N/100mL)	NULL	NULL	1	NULL	NULL	NULL	NULL	NULL	10-Jun-11
Enterococci (N/100mL)	NULL	NULL	1	NULL	NULL	NULL	NULL	NULL	10-Jul-11
Enterococci (N/100mL)	NULL	NULL	1	NULL	NULL	NULL	NULL	NULL	10-Aug-11
Enterococci (N/100mL)	NULL	NULL	1	NULL	NULL	NULL	NULL	NULL	10-Sep-11
Enterococci (N/100mL)	NULL	NULL	1	NULL	NULL	NULL	NULL	NULL	10-Oct-11
Enterococci (N/100mL)	NULL	NULL	1	NULL	NULL	NULL	NULL	NULL	10-Nov-11
CBOD (g/d) (mg/L)	2	6	2	NULL	5	5	5	5	10-Aug-07

Parameter	Quant	Avg	Quanti	Max	Conc	Avg	Conc Min	Conc Max	Due Date
CBOD (g/d) (mg/L)	1	<QL	<QL	1	NULL	<QL			10-Sep-07
CBOD (g/d) (mg/L)	<QL	<QL	<QL	<QL	NULL	<QL			10-Oct-07
CBOD (g/d) (mg/L)	2	<QL	<QL	2	NULL	<QL			10-Nov-07
CBOD (g/d) (mg/L)	1	2	1	1	NULL	2			10-Dec-07
CBOD (g/d) (mg/L)	0	2	0	0	NULL	2			10-Jan-08
CBOD (g/d) (mg/L)	<QL	<QL	<QL	<QL	NULL	<QL			10-Feb-08
CBOD (g/d) (mg/L)	1	3	1	1	NULL	3			10-Mar-08
CBOD (g/d) (mg/L)	<QL	<QL	<QL	<QL	NULL	<QL			10-Apr-08
CBOD (g/d) (mg/L)	<QL	<QL	<QL	<QL	NULL	<QL			10-May-08
CBOD (g/d) (mg/L)	3	12	1	1	NULL	5			10-Jun-08
CBOD (g/d) (mg/L)	1	2	0	0	NULL	2			10-Jul-08
CBOD (g/d) (mg/L)	2	6	2	2	NULL	7			10-Aug-08
CBOD (g/d) (mg/L)	2	6	2	2	NULL	8			10-Sep-08
CBOD (g/d) (mg/L)	1	2	1	1	NULL	2			10-Oct-08
CBOD (g/d) (mg/L)	3.81	1.37	3.81	3.81	NULL	1.34			10-Nov-08
CBOD (g/d) (mg/L)	1	2	0	0	NULL	2			10-Dec-08
CBOD (g/d) (mg/L)	1	4	1	1	NULL	4			10-Jan-09
CBOD (g/d) (mg/L)	1	2	1	1	NULL	2			10-Feb-09
CBOD (g/d) (mg/L)	7	10	7	7	NULL	9			10-Mar-09
CBOD (g/d) (mg/L)	3	6	3	3	NULL	6			10-Apr-09
CBOD (g/d) (mg/L)	1	3	1	1	NULL	2			10-May-09
CBOD (g/d) (mg/L)	1	3	1	1	NULL	3			10-Jun-09
CBOD (g/d) (mg/L)	1	3	1	1	NULL	2			10-Jul-09
CBOD (g/d) (mg/L)	0	2	0	0	NULL	2			10-Aug-09
CBOD (g/d) (mg/L)	2	9	2	2	NULL	7			10-Sep-09
CBOD (g/d) (mg/L)	2	5	1	1	NULL	2			10-Oct-09
CBOD (g/d) (mg/L)	2	6	1	1	NULL	4			10-Nov-09
CBOD (g/d) (mg/L)	31	14	4	4	NULL	7			10-Dec-09
CBOD (g/d) (mg/L)	<QL	<QL	<QL	<QL	NULL	<QL			10-Jan-10
CBOD (g/d) (mg/L)	<QL	<QL	<QL	<QL	NULL	<QL			10-Feb-10
CBOD (g/d) (mg/L)	10	21	4	4	NULL	8			10-Mar-10
CBOD (g/d) (mg/L)	5	5	2	2	NULL	2			10-Apr-10
CBOD (g/d) (mg/L)	<QL	<QL	<QL	<QL	NULL	<QL			10-May-10
CBOD (g/d) (mg/L)	1	3	0	0	NULL	2			10-Jun-10
CBOD (g/d) (mg/L)	3	7	1	1	NULL	4			10-Jul-10
CBOD (g/d) (mg/L)	2	6	1	1	NULL	5			10-Aug-10
CBOD (g/d) (mg/L)	<QL	<QL	<QL	<QL	NULL	<QL			10-Sep-10
CBOD (g/d) (mg/L)	1	3	1	1	NULL	3			10-Oct-10
CBOD (g/d) (mg/L)	7	21	4	4	NULL	11			10-Nov-10
CBOD (g/d) (mg/L)	1	0	1	1	NULL	0			10-Dec-10
CBOD (g/d) (mg/L)	1	2	1	1	NULL	2			10-Jan-11
CBOD (g/d) (mg/L)	<QL	<QL	<QL	<QL	NULL	<QL			10-Feb-11
CBOD (g/d) (mg/L)	<QL	<QL	<QL	<QL	NULL	<QL			10-Mar-11
CBOD (g/d) (mg/L)	<QL	<QL	<QL	<QL	NULL	<QL			10-Apr-11
CBOD (g/d) (mg/L)	<QL	<QL	<QL	<QL	NULL	<QL			10-May-11
CBOD (g/d) (mg/L)	<QL	<QL	<QL	<QL	NULL	<QL			10-Jun-11
CBOD (g/d) (mg/L)	<QL	<QL	<QL	<QL	NULL	<QL			10-Jul-11
CBOD (g/d) (mg/L)	<QL	<QL	<QL	<QL	NULL	<QL			10-Aug-11
CBOD (g/d) (mg/L)	<QL	<QL	<QL	<QL	NULL	<QL			10-Sep-11
CBOD (g/d) (mg/L)	<QL	<QL	<QL	<QL	NULL	<QL			10-Oct-11
CBOD (g/d) (mg/L)	<QL	<QL	<QL	<QL	NULL	<QL			10-Nov-11

Parameter	Quant	Avg	Quanti	Max	Conc	Avg	Conc	Min	Conc	Max	Due Date
TN(year to date) (mg/L)	NULL	NULL		3.12	NULL	NULL	NULL		NULL	NULL	10-Mar-11
TN(year to date) (mg/L)	NULL	NULL		2.9	NULL	NULL	NULL		NULL	NULL	10-Apr-11
TN(year to date) (mg/L)	NULL	NULL		2.9	NULL	NULL	NULL		NULL	NULL	10-May-11
TN(year to date) (mg/L)	NULL	NULL		3.0	NULL	NULL	NULL		NULL	NULL	10-Jun-11
TN(year to date) (mg/L)	NULL	NULL		3.0	NULL	NULL	NULL		NULL	NULL	10-Jul-11
TN(year to date) (mg/L)	NULL	NULL		3.2	NULL	NULL	NULL		NULL	NULL	10-Aug-11
TN(year to date) (mg/L)	NULL	NULL		3.3	NULL	NULL	NULL		NULL	NULL	10-Sep-11
TN(year to date) (mg/L)	NULL	NULL		3.2	NULL	NULL	NULL		NULL	NULL	10-Oct-11
TN(year to date) (mg/L)	NULL	NULL		3.2	NULL	NULL	NULL		NULL	NULL	10-Nov-11
TP (year to date) (mg/L)	NULL	NULL		0.12	NULL	NULL	NULL		NULL	NULL	10-Mar-11
TP (year to date) (mg/L)	NULL	NULL		0.10	NULL	NULL	NULL		NULL	NULL	10-Apr-11
TP (year to date) (mg/L)	NULL	NULL		0.10	NULL	NULL	NULL		NULL	NULL	10-May-11
TP (year to date) (mg/L)	NULL	NULL		.15	NULL	NULL	NULL		NULL	NULL	10-Jun-11
TP (year to date) (mg/L)	NULL	NULL		.013	NULL	NULL	NULL		NULL	NULL	10-Jul-11
TP (year to date) (mg/L)	NULL	NULL		1.11	NULL	NULL	NULL		NULL	NULL	10-Aug-11
TP (year to date) (mg/L)	NULL	NULL		.12	NULL	NULL	NULL		NULL	NULL	10-Sep-11
TP (year to date) (mg/L)	NULL	NULL		0.11	NULL	NULL	NULL		NULL	NULL	10-Oct-11
TP (year to date) (mg/L)	NULL	NULL		.11	NULL	NULL	NULL		NULL	NULL	10-Nov-11

**Attachment F: Receiving Stream data (Monitoring station 3-HOK000.74)**

Station ID	Collection Date	Depth Desc	Depth	Temp Celcius	Field Ph	Do Probe	Do Winkler	Fdt Do Optical	Salinity
3-HOK000.74	1/23/1990	S	0.3	5.4	6.51		13.1		
3-HOK000.74	2/22/1990	S	0.3	7.9	6.98		11.1		
3-HOK000.74	3/20/1990	S	0.3	14.7	6.8		7		
3-HOK000.74	4/24/1990	S	0.3	18.2	7.04		8.1		
3-HOK000.74	5/22/1990	S	0.3	18.9	7.21		7.2		
3-HOK000.74	6/19/1990	S	0.3	25.6	6.79		7.9		
3-HOK000.74	7/24/1990	S	1	28.5	6.34		5.6		
3-HOK000.74	8/21/1990	B	1	24.6	6.61		3.9		
3-HOK000.74	9/25/1990	S	0.3	18.8	6.92		7.6		
3-HOK000.74	10/25/1990	S	0.3	16.5	5.96		5.5		
3-HOK000.74	11/20/1990	S	0.3	8.3	7.27		10.3		
3-HOK000.74	12/18/1990	S	0.3	8.3	7.05		11.1		
3-HOK000.74	1/29/1991	S	0.3	4	7.49		12.5		
3-HOK000.74	3/19/1991	S	0.3	9.8	7.42		10		
3-HOK000.74	4/23/1991	S	0.3	14	6.65		10		
3-HOK000.74	5/21/1991	S	0.3	20.2	7.53		8		
3-HOK000.74	6/20/1991	S	0.3	25.2	7.31		6.4		
3-HOK000.74	7/23/1991	S	0.3	28.2	7.65		7.1		
3-HOK000.74	8/20/1991	S	0.3	22.2			7.9		
3-HOK000.74	10/21/1991	S	0.3	14.4	7.4		9		
3-HOK000.74	12/2/1991	S	0.3	12.2	7.6		9.2		
3-HOK000.74	12/19/1991	S	0.3	0.7	8.39		13.1		
3-HOK000.74	2/25/1992	S	0.3	8.7	7.38	9.1			
3-HOK000.74	3/24/1992	S	0.3	6.7	7.4		11		
3-HOK000.74	4/7/1992	S	0.3	10.9	7.6		9.3		
3-HOK000.74	5/19/1992	S	0.3	21.3	7.47	4.5			
3-HOK000.74	5/19/1992	B	1		7.47				
3-HOK000.74	6/23/1992	S	0.3	22.2	7.26	5.7			
3-HOK000.74	7/21/1992	S	0.3	28.5	6.8	6.4			6.5
3-HOK000.74	8/12/1992	S	0.3	27.9	7.29	7.8			4.5
3-HOK000.74	9/15/1992	S	0.3	22.6	6.82	7.1			2
3-HOK000.74	10/14/1992	S	0.3	16.7	7.99	7			3
3-HOK000.74	11/23/1992	S	0.3	14.3	6.35	9.1			4.5
3-HOK000.74	12/21/1992	S	0.3	5.5	6.79	10.9			0.5
3-HOK000.74	1/26/1993	S	0.3	5.1	9.21	10.9			0.5
3-HOK000.74	2/9/1993	S	0.3	4.3	6.64	11.4			2
3-HOK000.74	3/9/1993	S	0.3	8.4	8.97	10.2			0
3-HOK000.74	4/20/1993	S	0.3	17.6	7.59	7			0
3-HOK000.74	5/26/1993	S	0.3	21.4	6.75	5			0
3-HOK000.74	6/22/1993	S	0.3	26.8	6.83	5.3			1.5
3-HOK000.74	7/27/1993	S	0.3	27.3	7.45	6.2			7
3-HOK000.74	8/4/1993	S	0.3	26.6	7.05	5.3			5
3-HOK000.74	9/28/1993	S	0.3	21.1	7.22	7			5
3-HOK000.74	10/26/1993	S	0.3	15.7	7.37	8.4			8.5
3-HOK000.74	11/30/1993	S	0.3	8.5	6.81	8.5			2
3-HOK000.74	12/8/1993	S	0.3	8.4	8.74	9.6			0.5
3-HOK000.74	2/1/1994	S	0.3	1.5	7.38	12.1			0.5
3-HOK000.74	2/9/1994	S	0.3	3.3	6.99	12.6			1
3-HOK000.74	3/15/1994	S	0.3	8.9	7.63	10.2			0
3-HOK000.74	4/26/1994	S	0.3	19.5	6.76	7.2			0
3-HOK000.74	5/18/1994	S	0.3	17.3	7.41	8.3			0.1
3-HOK000.74	6/15/1994	S	0.3	26	6.91	6			2
3-HOK000.74	7/7/1994	S	0.3	28.4	6.51	5.8			1.5
3-HOK000.74	8/2/1994	S	0.3	26.3	6.27	5.2			0.5
3-HOK000.74	9/8/1994	S	0.3	22.4	6.65	5.3			2
3-HOK000.74	10/19/1994	S	0.3	15	7.12	7.3			4.5
3-HOK000.74	11/16/1994	S	0.3	13.15	7.16	9.09			6.6
3-HOK000.74	12/14/1994	S	0.3	6.5	7.19	11.4			4.9
3-HOK000.74	1/30/1995	S	0.3	2.54	6.77	11.79			2.9
3-HOK000.74	2/16/1995	S	0.3	2.5	8.31	12.5			1.5
3-HOK000.74	3/2/1995	S	0.3	7.5	7.97	9.6			1
3-HOK000.74	4/6/1995	S	0.3	11.2	6.67	9			
3-HOK000.74	5/16/1995	S	0.3	20.7	6.17	4.45			1.6
3-HOK000.74	6/8/1995	S	0.3	25.2	6.7	6.3			
3-HOK000.74	7/11/1995	S	0.3	26.6	6.7	3.5			
3-HOK000.74	8/10/1995	S	0.3	25.2	6.48	4.2			

Station ID	Collection Date	Depth Desc	Depth	Temp Celcius	Field Ph	Do Probe	Do Winkler	Fdt Do Optical	Salinity
3-HOK000.74	9/7/1995	S	0.3	25.2	6.86	5.6			
3-HOK000.74	10/12/1995	S	0.3	19.57	6.18	5.76			4.4
3-HOK000.74	11/27/1995	S	0.3	6.48	5.71	10.5			3.3
3-HOK000.74	12/13/1995	S	0.3	2.76	6.7	12.35			2.5
3-HOK000.74	1/25/1996	S	0.3	3.81	5.9	11.9			0
3-HOK000.74	2/22/1996	S	0.3	7.21	5.45	11.15			0
3-HOK000.74	3/14/1996	S	0.3	6.43	6.72	11.97			2.1
3-HOK000.74	4/11/1996	S	0.3	10.42	6.12	10.3			0
3-HOK000.74	5/23/1996	S	0.3	24.98	5.99	4.77			0.3
3-HOK000.74	6/6/1996	S	0.3	22.44	6.1	4.88			0.6
3-HOK000.74	7/25/1996	S	0.3	26.49	6.41	6.75			3.6
3-HOK000.74	8/8/1996	S	0.3	27.19	6.42	4.71			1.7
3-HOK000.74	9/19/1996	S	0.3	21.45	5.97	6.17			0.2
3-HOK000.74	10/17/1996	S	0.3	16.63	6.47	6.13			0
3-HOK000.74	11/7/1996	S	0.3	14.2	6.52	9.69			1.8
3-HOK000.74	12/5/1996	S	0.3	6.06	6.03	11.21			0.2
3-HOK000.74	1/8/1997	S	0.3	5.63	6.32	10.74			0
3-HOK000.74	2/6/1997	S	0.3	5.66	6.81	12.53			0
3-HOK000.74	3/12/1997	S	0.3	10.21	6.46	9.72			
3-HOK000.74	4/14/1997	S	0.3	15.04	6.28	7.52			0
3-HOK000.74	5/12/1997	S	0.3	16.73	6.61	8.96			1
3-HOK000.74	6/12/1997	S	0.3	21.97	6.54	7.63			2
3-HOK000.74	8/13/1997	S	0.3	27.57	6.78	5.67			6.1
3-HOK000.74	9/10/1997	S	0.3	24.8	7.01	6.01			7.3
3-HOK000.74	10/9/1997	S	0.3	21.59	6.96	6.49			7.9
3-HOK000.74	11/12/1997	S	0.3	10.86	6.87	9.39			2.2
3-HOK000.74	12/4/1997	S	0.3	7.61	6.48	8.22			2.9
3-HOK000.74	1/14/1998	S	0.3	6.86	6.65	9.33			1.1
3-HOK000.74	2/9/1998	S	0.3	4.98	6.41	11.87			
3-HOK000.74	3/5/1998	S	0.3	8.36	6.23	9.24			
3-HOK000.74	4/22/1998	S	0.3	17.31	6.66	9.29			
3-HOK000.74	5/7/1998	S	0.3	21.9	7.35	9.52			0
3-HOK000.74	6/11/1998	S	0.3	20.17	6.33	4.24			0.6
3-HOK000.74	7/9/1998	S	0.3	27.26	6.63	5.21			1.5
3-HOK000.74	8/6/1998	S	0.3	27.19	6.95	6.73			4.6
3-HOK000.74	9/10/1998	S	0.3	22.78	6.9	7.14			4.3
3-HOK000.74	10/8/1998	S	0.3	19.31	6.75	6.34			5.3
3-HOK000.74	11/12/1998	S	0.3	12	7.5	10.2			
3-HOK000.74	12/10/1998	S	0.3	12.02		8.08	8.2		7.1
3-HOK000.74	1/7/1999	S	0.3	1.13	6.1	13.27			3.5
3-HOK000.74	2/11/1999	S	0.3	7.29	6.55	9.04			3.5
3-HOK000.74	3/18/1999	S	0.3	10.53	6.55	10.31			1.9
3-HOK000.74	4/8/1999	S	0.3	16.85	6.57	8.15			3
3-HOK000.74	5/6/1999	S	0.3	15.6		7.8			
3-HOK000.74	6/14/1999	S	0.3	25.2	6.94	6.45			5.7
3-HOK000.74	7/8/1999	S	0.3	30.08	7.06	5.04			7.7
3-HOK000.74	8/5/1999	S	0.3	28.5	6.91	4.32			10.7
3-HOK000.74	9/9/1999	S	0.3	25.68	6.87	7.1			10.6
3-HOK000.74	10/12/1999	S	0.3	19.35	7.05	8.17			7.05
3-HOK000.74	11/4/1999	S	0.3	12.52	6.81	8.8			4.7
3-HOK000.74	12/9/1999	S	0.3	8.53	6.4	9.78			3.6
3-HOK000.74	2/10/2000	S	0.3	4.1	6.46	12.08			2.5
3-HOK000.74	3/9/2000	S	0.3	14.17	6.69	9.04			3
3-HOK000.74	4/6/2000	S	0.3	14.87	6.3	7			0.4
3-HOK000.74	5/11/2000	S	0.3	24.59	6.74	6.96			2
3-HOK000.74	6/8/2000	S	0.3	22.15		6.73			1.6
3-HOK000.74	8/10/2000	S	0.3	29.1	6.71	7.52			1.3
3-HOK000.74	9/12/2000	S	0.3	25.33	7.03	5.99			5.4
3-HOK000.74	10/12/2000	S	0.3	15.45	6.84	8.53			2.48
3-HOK000.74	11/13/2000	S	1	12.76	7.21	8.87			8.02
3-HOK000.74	12/7/2000	S	0.3	4.38	7.05	10.1			8.73
3-HOK000.74	1/18/2001	S	0.3	3.13	6.57	11.67			5.6
3-HOK000.74	2/8/2001	S	0.3	6.5	6.45	10.04			1.34
3-HOK000.74	3/15/2001	S	0.3	9.98	6.59	9.47			2.78
3-HOK000.74	4/12/2001	S	0.3	16.75	6.26	6.04			0.48
3-HOK000.74	6/6/2001	S	0.3	25.15	6.27	4.19			0.2



**Attachment G: MSTRANTI data source report,  
MSTRANTI, Stats.exe results**

**VA0071471- Town of Tappahannock WWTP**

**MSTRANTI DATA SOURCE REPORT  
Outfall 001**

<b>Stream Information:</b>	<b>Basis</b>
Mean Hardness	Not Applicable for Salt Water
90 <sup>th</sup> % Temperature (Annual)	Ambient Data for Station 3-HOK002.90
90 <sup>th</sup> % Temperature (Winter)	No Tiered Limitations, Not Applicable
90 <sup>th</sup> % Maximum pH	Ambient Data for Station 3-HOK002.90
10 <sup>th</sup> % Maximum pH	Ambient Data for Station 3-HOK002.90
Tier Designation	Flow Frequency Memorandum
Mean Salinity	Ambient Data for Station 3-HOK002.90
<b>Mixing Information:</b>	
Design Flow	Permit Application
Acute WLA Multiplier	Agency default per GM00-2011
Chronic WLA Multiplier	
Human Health WLA Multiplier	
<b>Effluent Information:</b>	
Mean Hardness	Not Applicable for Salt Water
90 <sup>th</sup> % Temperature (Annual)	Permit Application*
90 <sup>th</sup> % Temperature (Winter)	No Tiered Limitations, Not Applicable
90 <sup>th</sup> % Maximum pH	DMR data
10 <sup>th</sup> % Maximum pH	
Discharge Flow	Design flow as reported on application Form 2A

\*The Form 2A maximum summer temperature value reported is assumed to be a reasonable approximation of the 90<sup>th</sup> percentile annual temperature.

# SALTWATER AND TRANSITION ZONES

## WATER QUALITY CRITERIA / WASTELOAD ALLOCATION ANALYSIS

Facility Name:

Town of Tappahannock WWTP  
Receiving Stream: Hoskins Creek

Permit No.: VA0071471

Version: OWP Guidance Memo 00-2011 (8/24/00)

### Stream Information

Mean Hardness (as CaCO <sub>3</sub> ) =	mg/l	
90th % Temperature (Annual) =	27.3	(° C)
90th % Temperature (Winter) =		(° C)
90th % Maximum pH =	7.5	
10th % Maximum pH =	6.3	
Tier Designation (1 or 2) =	1	
Early Life Stages Present Y/N =	Y	
Tidal Zone =	1	(1 = saltwater, 2 = transition zone)
Mean Salinity =	2.7	(g/kg)

### Mixing Information

Design Flow (MGD)	0.8
Acute WLA multiplier	2
Chronic WLA multiplier	50
Human health WLA multiplier	50

### Effluent Information

Mean Hardness (as CaCO <sub>3</sub> ) =	mg/L	
90 % Temperature (Annual) =	30	(° C)
90 % Temperature (Winter) =		(° C)
90 % Maximum pH =	8.2	SU
10 % Maximum pH =	7.7	SU
Discharge Flow =	0.8	MGD

Parameter (ug/l unless noted)	Background Conc.	Water Quality Criteria			Wasteload Allocations			Antidegradation Baseline			Antidegradation Allocations			Most Limiting Allocations		
		Acute	Chronic	HH	Acute	Chronic	HH	Acute	Chronic	HH	Acute	Chronic	HH	Acute	Chronic	HH
Acenaphthene	0	--	--	9.9E+02	--	--	5.0E+04	--	--	--	--	--	--	--	--	5.0E+04
Acrolein		--	--	9.3E+00	--	--	4.7E+02	--	--	--	--	--	--	--	--	4.7E+02
Acrylonitrile <sup>c</sup>		--	--	2.5E+00	--	--	1.3E+02	--	--	--	--	--	--	--	--	1.3E+02
Aldrin <sup>c</sup>	0	1.3E+00	--	5.0E-04	2.6E+00	--	2.5E-02	--	--	--	--	--	--	2.6E+00	--	2.5E-02
Ammonia-N (mg/l) - Annual	0	#####	1.37E+00	--	1.02E+01	6.86E+01	--	--	--	--	--	--	--	1.02E+01	6.86E+01	--
Ammonia-N (mg/l) - Winter	0	#####	1.04E+01	--	8.36E+01	5.18E+02	--	--	--	--	--	--	--	8.36E+01	5.18E+02	--
Anthracene	0	--	--	4.0E+04	--	--	2.0E+06	--	--	--	--	--	--	--	--	2.0E+06
Antimony	0	--	--	6.4E+02	--	--	3.2E+04	--	--	--	--	--	--	--	--	3.2E+04
Arsenic	0	6.9E+01	3.6E+01	--	1.4E+02	1.8E+03	--	--	--	--	--	--	--	1.4E+02	1.8E+03	--
Benzene <sup>c</sup>	0	--	--	5.1E+02	--	--	2.6E+04	--	--	--	--	--	--	--	--	2.6E+04
Benzidine <sup>c</sup>		--	--	2.0E-03	--	--	1.0E-01	--	--	--	--	--	--	--	--	1.0E-01
Benzo (a) anthracene <sup>c</sup>	0	--	--	1.8E-01	--	--	9.0E+00	--	--	--	--	--	--	--	--	9.0E+00
Benzo (b) fluoranthene <sup>c</sup>	0	--	--	1.8E-01	--	--	9.0E+00	--	--	--	--	--	--	--	--	9.0E+00
Benzo (k) fluoranthene <sup>c</sup>	0	--	--	1.8E-01	--	--	9.0E+00	--	--	--	--	--	--	--	--	9.0E+00
Benzo (a) pyrene <sup>c</sup>	0	--	--	1.8E-01	--	--	9.0E+00	--	--	--	--	--	--	--	--	9.0E+00
Bis2-Chloroethyl Ether <sup>c</sup>	0	--	--	5.3E+00	--	--	2.7E+02	--	--	--	--	--	--	--	--	2.7E+02
Bis2-Chloroisopropyl Ether	0	--	--	6.5E+04	--	--	3.3E+06	--	--	--	--	--	--	--	--	3.3E+06
Bis2-Ethylhexyl Phthalate <sup>c</sup>	0	--	--	2.2E+01	--	--	1.1E+03	--	--	--	--	--	--	--	--	1.1E+03
Bromoform <sup>c</sup>	0	--	--	1.4E+03	--	--	7.0E+04	--	--	--	--	--	--	--	--	7.0E+04
Butylbenzylphthalate	0	--	--	1.9E+03	--	--	9.5E+04	--	--	--	--	--	--	--	--	9.5E+04
Cadmium	0	4.0E+01	8.8E+00	--	8.0E+01	4.4E+02	--	--	--	--	--	--	--	8.0E+01	4.4E+02	--
Carbon Tetrachloride <sup>c</sup>	0	--	--	1.6E+01	--	--	8.0E+02	--	--	--	--	--	--	--	--	8.0E+02
Chlordane <sup>c</sup>	0	9.0E-02	4.0E-03	8.1E-03	1.8E-01	2.0E-01	4.1E-01	--	--	--	--	--	--	1.8E-01	2.0E-01	4.1E-01

Parameter (ug/l unless noted)	Background Conc.	Water Quality Criteria			Wasteload Allocations			Antidegradation Baseline			Antidegradation Allocations			Most Limiting Allocations		
		Acute	Chronic	HH	Acute	Chronic	HH	Acute	Chronic	HH	Acute	Chronic	HH	Acute	Chronic	HH
TRC	0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chlorine Prod. Oxidant	0	1.3E+01	7.5E+00	--	2.6E+01	3.8E+02	--	--	--	--	--	--	--	<b>2.6E+01</b>	<b>3.8E+02</b>	--
Chlorobenzene		--	--	1.6E+03	--	--	8.0E+04	--	--	--	--	--	--	--	--	<b>8.0E+04</b>
Chlorodibromomethane <sup>c</sup>	0	--	--	1.3E+02	--	--	6.5E+03	--	--	--	--	--	--	--	--	<b>6.5E+03</b>
Chloroform	0	--	--	1.1E+04	--	--	5.5E+05	--	--	--	--	--	--	--	--	<b>5.5E+05</b>
2-Chloronaphthalene	0	--	--	1.6E+03	--	--	8.0E+04	--	--	--	--	--	--	--	--	<b>8.0E+04</b>
2-Chlorophenol	0	--	--	1.5E+02	--	--	7.5E+03	--	--	--	--	--	--	--	--	<b>7.5E+03</b>
Chlorpyrifos	0	1.1E-02	5.6E-03	--	2.2E-02	2.8E-01	--	--	--	--	--	--	--	<b>2.2E-02</b>	<b>2.8E-01</b>	--
Chromium III	0		--	--		--	--	--	--	--	--	--	--	--	--	--
Chromium VI	0	1.1E+03	5.0E+01	--	2.2E+03	2.5E+03	--	--	--	--	--	--	--	<b>2.2E+03</b>	<b>2.5E+03</b>	--
Chrysene <sup>c</sup>	0	--	--	1.8E-02	--	--	9.0E-01	--	--	--	--	--	--	--	--	<b>9.0E-01</b>
Copper	0	9.3E+00	6.0E+00	--	1.9E+01	3.0E+02	--	--	--	--	--	--	--	<b>1.9E+01</b>	<b>3.0E+02</b>	--
Cyanide, Free	0	1.0E+00	1.0E+00	1.6E+04	2.0E+00	5.0E+01	8.0E+05	--	--	--	--	--	--	<b>2.0E+00</b>	<b>5.0E+01</b>	<b>8.0E+05</b>
DDD <sup>c</sup>	0	--	--	3.1E-03	--	--	1.6E-01	--	--	--	--	--	--	--	--	<b>1.6E-01</b>
DDE <sup>c</sup>	0	--	--	2.2E-03	--	--	1.1E-01	--	--	--	--	--	--	--	--	<b>1.1E-01</b>
DDT <sup>c</sup>	0	1.3E-01	1.0E-03	2.2E-03	2.6E-01	5.0E-02	1.1E-01	--	--	--	--	--	--	<b>2.6E-01</b>	<b>5.0E-02</b>	<b>1.1E-01</b>
Demeton	0	--	1.0E-01	--	--	5.0E+00	--	--	--	--	--	--	--	--	<b>5.0E+00</b>	--
Diazinon	0	8.2E-01	8.2E-01	--	1.6E+00	4.1E+01	--	--	--	--	--	--	--	<b>1.6E+00</b>	<b>4.1E+01</b>	--
Dibenz(a,h)anthracene <sup>c</sup>	0	--	--	1.8E-01	--	--	9.0E+00	--	--	--	--	--	--	--	--	<b>9.0E+00</b>
1,2-Dichlorobenzene	0	--	--	1.3E+03	--	--	6.5E+04	--	--	--	--	--	--	--	--	<b>6.5E+04</b>
1,3-Dichlorobenzene	0	--	--	9.6E+02	--	--	4.8E+04	--	--	--	--	--	--	--	--	<b>4.8E+04</b>
1,4-Dichlorobenzene	0	--	--	1.9E+02	--	--	9.5E+03	--	--	--	--	--	--	--	--	<b>9.5E+03</b>
3,3-Dichlorobenzidine <sup>c</sup>	0	--	--	2.8E-01	--	--	1.4E+01	--	--	--	--	--	--	--	--	--
Dichlorobromomethane <sup>c</sup>	0	--	--	1.7E+02	--	--	8.5E+03	--	--	--	--	--	--	--	--	<b>8.5E+03</b>
1,2-Dichloroethane <sup>c</sup>	0	--	--	3.7E+02	--	--	1.9E+04	--	--	--	--	--	--	--	--	<b>1.9E+04</b>
1,1-Dichloroethylene	0	--	--	7.1E+03	--	--	3.6E+05	--	--	--	--	--	--	--	--	<b>3.6E+05</b>
1,2-trans-dichloroethylene	0	--	--	1.0E+04	--	--	5.0E+05	--	--	--	--	--	--	--	--	<b>5.0E+05</b>
2,4-Dichlorophenol	0	--	--	2.9E+02	--	--	1.5E+04	--	--	--	--	--	--	--	--	<b>1.5E+04</b>
1,2-Dichloropropane <sup>c</sup>	0	--	--	1.5E+02	--	--	7.5E+03	--	--	--	--	--	--	--	--	<b>7.5E+03</b>
1,3-Dichloropropene <sup>c</sup>	0	--	--	2.1E+02	--	--	1.1E+04	--	--	--	--	--	--	--	--	<b>1.1E+04</b>
Dieldrin <sup>c</sup>	0	7.1E-01	1.9E-03	5.4E-04	1.4E+00	9.5E-02	2.7E-02	--	--	--	--	--	--	<b>1.4E+00</b>	<b>9.5E-02</b>	<b>2.7E-02</b>
Diethyl Phthalate	0	--	--	4.4E+04	--	--	2.2E+06	--	--	--	--	--	--	--	--	<b>2.2E+06</b>
2,4-Dimethylphenol	0	--	--	8.5E+02	--	--	4.3E+04	--	--	--	--	--	--	--	--	<b>4.3E+04</b>
Dimethyl Phthalate	0	--	--	1.1E+06	--	--	5.5E+07	--	--	--	--	--	--	--	--	<b>5.5E+07</b>
Di-n-Butyl Phthalate	0	--	--	4.5E+03	--	--	2.3E+05	--	--	--	--	--	--	--	--	<b>2.3E+05</b>
2,4 Dinitrophenol	0	--	--	5.3E+03	--	--	2.7E+05	--	--	--	--	--	--	--	--	<b>2.7E+05</b>
2-Methyl-4,6-Dinitrophenol	0	--	--	2.8E+02	--	--	1.4E+04	--	--	--	--	--	--	--	--	<b>1.4E+04</b>
2,4-Dinitrotoluene <sup>c</sup>	0	--	--	3.4E+01	--	--	1.7E+03	--	--	--	--	--	--	--	--	<b>1.7E+03</b>
Dioxin 2,3,7,8-tetrachlorodibenzo-p-dioxin	0	--	--	5.1E-08	--	--	2.6E-06	--	--	--	--	--	--	--	--	<b>2.6E-06</b>
1,2-Diphenylhydrazine <sup>c</sup>	0	--	--	2.0E+00	--	--	1.0E+02	--	--	--	--	--	--	--	--	<b>1.0E+02</b>
Alpha-Endosulfan	0	3.4E-02	8.7E-03	8.9E+01	6.8E-02	4.4E-01	4.5E+03	--	--	--	--	--	--	<b>6.8E-02</b>	<b>4.4E-01</b>	<b>4.5E+03</b>

Parameter (ug/l unless noted)	Background Conc.	Water Quality Criteria			Wasteload Allocations			Antidegradation Baseline			Antidegradation Allocations			Most Limiting Allocations		
		Acute	Chronic	HH	Acute	Chronic	HH	Acute	Chronic	HH	Acute	Chronic	HH	Acute	Chronic	HH
Beta-Endosulfan	0	3.4E-02	8.7E-03	8.9E+01	6.8E-02	4.4E-01	4.5E+03	--	--	--	--	--	--	<b>6.8E-02</b>	<b>4.4E-01</b>	<b>4.5E+03</b>
Alpha + Beta Endosulfan	0	3.4E-02	8.7E-03	--	6.8E-02	4.4E-01	--	--	--	--	--	--	--	<b>6.8E-02</b>	<b>4.4E-01</b>	--
Endosulfan Sulfate	0	--	--	8.9E+01	--	--	4.5E+03	--	--	--	--	--	--	--	--	<b>4.5E+03</b>
Endrin	0	3.7E-02	2.3E-03	6.0E-02	7.4E-02	1.2E-01	3.0E+00	--	--	--	--	--	--	<b>7.4E-02</b>	<b>1.2E-01</b>	<b>3.0E+00</b>
Endrin Aldehyde	0	--	--	3.0E-01	--	--	1.5E+01	--	--	--	--	--	--	--	--	<b>1.5E+01</b>
Ethylbenzene	0	--	--	2.1E+03	--	--	1.1E+05	--	--	--	--	--	--	--	--	<b>1.1E+05</b>
Fluoranthene	0	--	--	1.4E+02	--	--	7.0E+03	--	--	--	--	--	--	--	--	<b>7.0E+03</b>
Fluorene	0	--	--	5.3E+03	--	--	2.7E+05	--	--	--	--	--	--	--	--	<b>2.7E+05</b>
Guthion	0	--	1.0E-02	--	--	5.0E-01	--	--	--	--	--	--	--	--	<b>5.0E-01</b>	--
Heptachlor <sup>c</sup>	0	5.3E-02	3.6E-03	7.9E-04	1.1E-01	1.8E-01	4.0E-02	--	--	--	--	--	--	<b>1.1E-01</b>	<b>1.8E-01</b>	<b>4.0E-02</b>
Heptachlor Epoxide <sup>c</sup>	0	5.3E-02	3.6E-03	3.9E-04	1.1E-01	1.8E-01	2.0E-02	--	--	--	--	--	--	<b>1.1E-01</b>	<b>1.8E-01</b>	<b>2.0E-02</b>
Hexachlorobenzene <sup>c</sup>	0	--	--	2.9E-03	--	--	1.5E-01	--	--	--	--	--	--	--	--	<b>1.5E-01</b>
Hexachlorobutadiene <sup>c</sup>	0	--	--	1.8E+02	--	--	9.0E+03	--	--	--	--	--	--	--	--	<b>9.0E+03</b>
Hexachlorocyclohexane																
Alpha-BHC <sup>c</sup>	0	--	--	4.9E-02	--	--	2.5E+00	--	--	--	--	--	--	--	--	<b>2.5E+00</b>
Hexachlorocyclohexane Beta-BHC <sup>c</sup>	0	--	--	1.7E-01	--	--	8.5E+00	--	--	--	--	--	--	--	--	<b>8.5E+00</b>
Hexachlorocyclohexane																
Gamma-BHC <sup>c</sup> (Lindane)	0	1.6E-01	--	1.8E+00	3.2E-01	--	9.0E+01	--	--	--	--	--	--	<b>3.2E-01</b>	--	<b>9.0E+01</b>
Hexachlorocyclopentadiene	0	--	--	1.1E+03	--	--	5.5E+04	--	--	--	--	--	--	--	--	<b>5.5E+04</b>
Hexachloroethane <sup>c</sup>	0	--	--	3.3E+01	--	--	1.7E+03	--	--	--	--	--	--	--	--	<b>1.7E+03</b>
Hydrogen Sulfide	0	--	2.0E+00	--	--	1.0E+02	--	--	--	--	--	--	--	--	<b>1.0E+02</b>	--
Indeno (1,2,3-cd) pyrene C	0	--	--	1.8E-01	--	--	9.0E+00	--	--	--	--	--	--	--	--	<b>9.0E+00</b>
Isophorone <sup>c</sup>	0	--	--	9.6E+03	--	--	4.8E+05	--	--	--	--	--	--	--	--	<b>4.8E+05</b>
Kepone	0	--	0.0E+00	--	--	0.0E+00	--	--	--	--	--	--	--	--	<b>0.0E+00</b>	--
Lead	0	2.4E+02	9.3E+00	--	4.8E+02	4.7E+02	--	--	--	--	--	--	--	<b>4.8E+02</b>	<b>4.7E+02</b>	--
Malathion	0	--	1.0E-01	--	--	5.0E+00	--	--	--	--	--	--	--	--	<b>5.0E+00</b>	--
Mercury	0	1.8E+00	9.4E-01	--	3.6E+00	4.7E+01	--	--	--	--	--	--	--	<b>3.6E+00</b>	<b>4.7E+01</b>	--
Methyl Bromide	0	--	--	1.5E+03	--	--	7.5E+04	--	--	--	--	--	--	--	--	<b>7.5E+04</b>
Methylene Chloride <sup>c</sup>	0	--	--	5.9E+03	--	--	3.0E+05	--	--	--	--	--	--	--	--	<b>3.0E+05</b>
Methoxychlor	0	--	3.0E-02	--	--	1.5E+00	--	--	--	--	--	--	--	--	<b>1.5E+00</b>	--
Mirex	0	--	0.0E+00	--	--	0.0E+00	--	--	--	--	--	--	--	--	<b>0.0E+00</b>	--
Nickel	0	7.4E+01	8.2E+00	4.6E+03	1.5E+02	4.1E+02	2.3E+05	--	--	--	--	--	--	<b>1.5E+02</b>	<b>4.1E+02</b>	<b>2.3E+05</b>
Nitrobenzene	0	--	--	6.9E+02	--	--	3.5E+04	--	--	--	--	--	--	--	--	<b>3.5E+04</b>
N-Nitrosodimethylamine <sup>c</sup>	0	--	--	3.0E+01	--	--	1.5E+03	--	--	--	--	--	--	--	--	<b>1.5E+03</b>
N-Nitrosodiphenylamine <sup>c</sup>	0	--	--	6.0E+01	--	--	3.0E+03	--	--	--	--	--	--	--	--	<b>3.0E+03</b>
N-Nitrosodi-n-propylamine <sup>c</sup>	0	--	--	5.1E+00	--	--	2.6E+02	--	--	--	--	--	--	--	--	<b>2.6E+02</b>
Nonylphenol	0	7.0E+00	1.7E+00	--	1.4E+01	8.5E+01	--	--	--	--	--	--	--	<b>1.4E+01</b>	<b>8.5E+01</b>	--
Parathion	0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB Total <sup>c</sup>	0	--	3.0E-02	6.4E-04	--	1.5E+00	3.2E-02	--	--	--	--	--	--	--	<b>1.5E+00</b>	<b>3.2E-02</b>
Pentachlorophenol <sup>c</sup>	0	1.3E+01	7.9E+00	3.0E+01	2.6E+01	4.0E+02	1.5E+03	--	--	--	--	--	--	<b>2.6E+01</b>	<b>4.0E+02</b>	<b>1.5E+03</b>

Parameter (ug/l unless noted)	Background Conc.	Water Quality Criteria			Wasteload Allocations			Antidegradation Baseline			Antidegradation Allocations			Most Limiting Allocations		
		Acute	Chronic	HH	Acute	Chronic	HH	Acute	Chronic	HH	Acute	Chronic	HH	Acute	Chronic	HH
Phenol	0	--	--	8.6E+05	--	--	4.3E+07	--	--	--	--	--	--	--	--	4.3E+07
Phosphorus (Elemental)	0	--	1.0E-01	--	--	5.0E+00	--	--	--	--	--	--	--	--	5.0E+00	--
Pyrene	0	--	--	4.0E+03	--	--	2.0E+05	--	--	--	--	--	--	--	--	2.0E+05
Radionuclides Beta and Photon Activity (mrem/yr)	0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Selenium	0	2.9E+02	7.1E+01	4.2E+03	5.8E+02	3.6E+03	2.1E+05	--	--	--	--	--	--	5.8E+02	3.6E+03	2.1E+05
Silver	0	1.9E+00	--	--	3.8E+00	--	--	--	--	--	--	--	--	3.8E+00	--	--
1,1,2,2-Tetrachloroethane <sup>C</sup>	0	--	--	4.0E+01	--	--	2.0E+03	--	--	--	--	--	--	--	--	2.0E+03
Tetrachloroethylene <sup>C</sup>	0	--	--	3.3E+01	--	--	1.7E+03	--	--	--	--	--	--	--	--	1.7E+03
Thallium	0	--	--	4.7E-01	--	--	2.4E+01	--	--	--	--	--	--	--	--	2.4E+01
Toluene	0	--	--	6.0E+03	--	--	3.0E+05	--	--	--	--	--	--	--	--	3.0E+05
Toxaphene <sup>C</sup>	0	2.1E-01	2.0E-04	2.8E-03	4.2E-01	1.0E-02	1.4E-01	--	--	--	--	--	--	4.2E-01	1.0E-02	1.4E-01
Tributyltin	0	4.2E-01	7.4E-03	--	8.4E-01	3.7E-01	--	--	--	--	--	--	--	8.4E-01	3.7E-01	--
1,2,4-Trichlorobenzene	0	--	--	7.0E+01	--	--	3.5E+03	--	--	--	--	--	--	--	--	3.5E+03
1,1,2-Trichloroethane <sup>C</sup>	--	--	1.6E+02	--	--	8.0E+03	--	--	--	--	--	--	--	--	--	8.0E+03
Trichloroethylene <sup>C</sup>	0	--	--	3.0E+02	--	--	1.5E+04	--	--	--	--	--	--	--	--	1.5E+04
2,4,6-Trichlorophenol <sup>C</sup>	0	--	--	2.4E+01	--	--	1.2E+03	--	--	--	--	--	--	--	--	1.2E+03
Vinyl Chloride <sup>C</sup>	0	--	--	2.4E+01	--	--	1.2E+03	--	--	--	--	--	--	--	--	1.2E+03
Zinc	0	9.0E+01	8.1E+01	2.6E+04	1.8E+02	4.1E+03	1.3E+06	--	--	--	--	--	--	1.8E+02	4.1E+03	1.3E+06

Notes:

1. All concentrations expressed as micrograms/liter (ug/l), unless noted otherwise
2. Discharge flow is highest monthly average or Form 2C maximum for Industries and design flow for Municipalities
3. Metals measured as Dissolved, unless specified otherwise
4. "C" indicates a carcinogenic parameter
5. For transition zone waters, spreadsheet prints the lesser of the freshwater and saltwater water quality criteria.
6. Regular WLA = (WQC x WLA multiplier) - (WLA multiplier - 1)(background conc.)
7. Antideg. Baseline = (0.25(WQC - background conc.) + background conc.) for acute and chronic  
= (0.1(WQC - background conc.) + background conc.) for human health
8. Antideg. WLA = (Antideg. Baseline)(WLA multiplier) - (WLA multiplier - 1)(background conc.)

Site Specific	
Metal	Target Value (SSTV)
Antimony	3.2E+04
Arsenic III	5.5E+01
Cadmium	3.2E+01
Chromium III	#VALUE!
Chromium VI	8.8E+02
Copper	7.4E+00
Lead	1.9E+02
Mercury	1.4E+00
Nickel	5.9E+01
Selenium	2.3E+02
Silver	1.5E+00
Zinc	7.2E+01

Note: do not use QL's lower than the minimum QL's provided in agency guidance

**SALTWATER AND TRANSITION ZONES**  
**WATER QUALITY CRITERIA / WASTELOAD ALLOCATION ANALYSIS**

Facility Name:

Town of Tappahannock WWTP  
Hoskins Creek

Permit No.: VA0071471

Version: OWP Guidance Memo 00-2011 (8/24/00)

**Stream Information**

Mean Hardness (as CaCO <sub>3</sub> ) =	mg/l	
90th % Temperature (Annual) =	27.3	(° C)
90th % Temperature (Winter) =		(° C)
90th % Maximum pH =	7.5	
10th % Maximum pH =	6.3	
Tier Designation (1 or 2) =	1	
Early Life Stages Present Y/N =	Y	
Tidal Zone =	1	(1 = saltwater, 2 = transition zone)
Mean Salinity =	2.7	(g/kg)

**Mixing Information**

Design Flow (MGD)	0.95
Acute WLA multiplier	2
Chronic WLA multiplier	50
Human health WLA multiplier	50

**Effluent Information**

Mean Hardness (as CaCO <sub>3</sub> ) =	mg/L	
90 % Temperature (Annual) =	30	(° C)
90 % Temperature (Winter) =		(° C)
90 % Maximum pH =	8.2	SU
10 % Maximum pH =	7.7	SU
Discharge Flow =	0.95	MGD

Parameter (ug/l unless noted)	Background Conc.	Water Quality Criteria			Wasteload Allocations			Antidegradation Baseline			Antidegradation Allocations			Most Limiting Allocations		
		Acute	Chronic	HH	Acute	Chronic	HH	Acute	Chronic	HH	Acute	Chronic	HH	Acute	Chronic	HH
Acenaphthene	0	--	--	9.9E+02	--	--	5.0E+04	--	--	--	--	--	--	--	--	5.0E+04
Acrolein		--	--	9.3E+00	--	--	4.7E+02	--	--	--	--	--	--	--	--	4.7E+02
Acrylonitrile <sup>C</sup>		--	--	2.5E+00	--	--	1.3E+02	--	--	--	--	--	--	--	--	1.3E+02
Aldrin <sup>C</sup>	0	1.3E+00	--	5.0E-04	2.6E+00	--	2.5E-02	--	--	--	--	--	--	2.6E+00	--	2.5E-02
Ammonia-N (mg/l) - Annual	0	#####	1.37E+00	--	1.02E+01	6.86E+01	--	--	--	--	--	--	--	1.02E+01	6.86E+01	--
Ammonia-N (mg/l) - Winter	0	#####	1.04E+01	--	8.36E+01	5.18E+02	--	--	--	--	--	--	--	8.36E+01	5.18E+02	--
Anthracene	0	--	--	4.0E+04	--	--	2.0E+06	--	--	--	--	--	--	--	--	2.0E+06
Antimony	0	--	--	6.4E+02	--	--	3.2E+04	--	--	--	--	--	--	--	--	3.2E+04
Arsenic	0	6.9E+01	3.6E+01	--	1.4E+02	1.8E+03	--	--	--	--	--	--	--	1.4E+02	1.8E+03	--
Benzene <sup>C</sup>	0	--	--	5.1E+02	--	--	2.6E+04	--	--	--	--	--	--	--	--	2.6E+04
Benzidine <sup>C</sup>		--	--	2.0E-03	--	--	1.0E-01	--	--	--	--	--	--	--	--	1.0E-01
Benzo (a) anthracene <sup>C</sup>	0	--	--	1.8E-01	--	--	9.0E+00	--	--	--	--	--	--	--	--	9.0E+00
Benzo (b) fluoranthene <sup>C</sup>	0	--	--	1.8E-01	--	--	9.0E+00	--	--	--	--	--	--	--	--	9.0E+00
Benzo (k) fluoranthene <sup>C</sup>	0	--	--	1.8E-01	--	--	9.0E+00	--	--	--	--	--	--	--	--	9.0E+00
Benzo (a) pyrene <sup>C</sup>	0	--	--	1.8E-01	--	--	9.0E+00	--	--	--	--	--	--	--	--	9.0E+00
Bis2-Chloroethyl Ether <sup>C</sup>	0	--	--	5.3E+00	--	--	2.7E+02	--	--	--	--	--	--	--	--	2.7E+02
Bis2-Chloroisopropyl Ether	0	--	--	6.5E+04	--	--	3.3E+06	--	--	--	--	--	--	--	--	3.3E+06
Bis2-Ethylhexyl Phthalate <sup>C</sup>	0	--	--	2.2E+01	--	--	1.1E+03	--	--	--	--	--	--	--	--	1.1E+03
Bromoform <sup>C</sup>	0	--	--	1.4E+03	--	--	7.0E+04	--	--	--	--	--	--	--	--	7.0E+04
Butylbenzylphthalate	0	--	--	1.9E+03	--	--	9.5E+04	--	--	--	--	--	--	--	--	9.5E+04
Cadmium	0	4.0E+01	8.8E+00	--	8.0E+01	4.4E+02	--	--	--	--	--	--	--	8.0E+01	4.4E+02	--
Carbon Tetrachloride <sup>C</sup>	0	--	--	1.6E+01	--	--	8.0E+02	--	--	--	--	--	--	--	--	8.0E+02
Chlordane <sup>C</sup>	0	9.0E-02	4.0E-03	8.1E-03	1.8E-01	2.0E-01	4.1E-01	--	--	--	--	--	--	1.8E-01	2.0E-01	4.1E-01

Parameter (ug/l unless noted)	Background Conc.	Water Quality Criteria			Wasteload Allocations			Antidegradation Baseline			Antidegradation Allocations			Most Limiting Allocations		
		Acute	Chronic	HH	Acute	Chronic	HH	Acute	Chronic	HH	Acute	Chronic	HH	Acute	Chronic	HH
TRC	0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chlorine Prod. Oxidant	0	1.3E+01	7.5E+00	--	2.6E+01	3.8E+02	--	--	--	--	--	--	--	<b>2.6E+01</b>	<b>3.8E+02</b>	--
Chlorobenzene		--	--	1.6E+03	--	--	8.0E+04	--	--	--	--	--	--	--	--	<b>8.0E+04</b>
Chlorodibromomethane <sup>c</sup>	0	--	--	1.3E+02	--	--	6.5E+03	--	--	--	--	--	--	--	--	<b>6.5E+03</b>
Chloroform	0	--	--	1.1E+04	--	--	5.5E+05	--	--	--	--	--	--	--	--	<b>5.5E+05</b>
2-Chloronaphthalene	0	--	--	1.6E+03	--	--	8.0E+04	--	--	--	--	--	--	--	--	<b>8.0E+04</b>
2-Chlorophenol	0	--	--	1.5E+02	--	--	7.5E+03	--	--	--	--	--	--	--	--	<b>7.5E+03</b>
Chlorpyrifos	0	1.1E-02	5.6E-03	--	2.2E-02	2.8E-01	--	--	--	--	--	--	--	<b>2.2E-02</b>	<b>2.8E-01</b>	--
Chromium III	0		--	--		--	--	--	--	--	--	--	--	--	--	--
Chromium VI	0	1.1E+03	5.0E+01	--	2.2E+03	2.5E+03	--	--	--	--	--	--	--	<b>2.2E+03</b>	<b>2.5E+03</b>	--
Chrysene <sup>c</sup>	0	--	--	1.8E-02	--	--	9.0E-01	--	--	--	--	--	--	--	--	<b>9.0E-01</b>
Copper	0	9.3E+00	6.0E+00	--	1.9E+01	3.0E+02	--	--	--	--	--	--	--	<b>1.9E+01</b>	<b>3.0E+02</b>	--
Cyanide, Free	0	1.0E+00	1.0E+00	1.6E+04	2.0E+00	5.0E+01	8.0E+05	--	--	--	--	--	--	<b>2.0E+00</b>	<b>5.0E+01</b>	<b>8.0E+05</b>
DDD <sup>c</sup>	0	--	--	3.1E-03	--	--	1.6E-01	--	--	--	--	--	--	--	--	<b>1.6E-01</b>
DDE <sup>c</sup>	0	--	--	2.2E-03	--	--	1.1E-01	--	--	--	--	--	--	--	--	<b>1.1E-01</b>
DDT <sup>c</sup>	0	1.3E-01	1.0E-03	2.2E-03	2.6E-01	5.0E-02	1.1E-01	--	--	--	--	--	--	<b>2.6E-01</b>	<b>5.0E-02</b>	<b>1.1E-01</b>
Demeton	0	--	1.0E-01	--	--	5.0E+00	--	--	--	--	--	--	--	--	<b>5.0E+00</b>	--
Diazinon	0	8.2E-01	8.2E-01	--	1.6E+00	4.1E+01	--	--	--	--	--	--	--	<b>1.6E+00</b>	<b>4.1E+01</b>	--
Dibenz(a,h)anthracene <sup>c</sup>	0	--	--	1.8E-01	--	--	9.0E+00	--	--	--	--	--	--	--	--	<b>9.0E+00</b>
1,2-Dichlorobenzene	0	--	--	1.3E+03	--	--	6.5E+04	--	--	--	--	--	--	--	--	<b>6.5E+04</b>
1,3-Dichlorobenzene	0	--	--	9.6E+02	--	--	4.8E+04	--	--	--	--	--	--	--	--	<b>4.8E+04</b>
1,4-Dichlorobenzene	0	--	--	1.9E+02	--	--	9.5E+03	--	--	--	--	--	--	--	--	<b>9.5E+03</b>
3,3-Dichlorobenzidine <sup>c</sup>	0	--	--	2.8E-01	--	--	1.4E+01	--	--	--	--	--	--	--	--	--
Dichlorobromomethane <sup>c</sup>	0	--	--	1.7E+02	--	--	8.5E+03	--	--	--	--	--	--	--	--	<b>8.5E+03</b>
1,2-Dichloroethane <sup>c</sup>	0	--	--	3.7E+02	--	--	1.9E+04	--	--	--	--	--	--	--	--	<b>1.9E+04</b>
1,1-Dichloroethylene	0	--	--	7.1E+03	--	--	3.6E+05	--	--	--	--	--	--	--	--	<b>3.6E+05</b>
1,2-trans-dichloroethylene	0	--	--	1.0E+04	--	--	5.0E+05	--	--	--	--	--	--	--	--	<b>5.0E+05</b>
2,4-Dichlorophenol	0	--	--	2.9E+02	--	--	1.5E+04	--	--	--	--	--	--	--	--	<b>1.5E+04</b>
1,2-Dichloropropane <sup>c</sup>	0	--	--	1.5E+02	--	--	7.5E+03	--	--	--	--	--	--	--	--	<b>7.5E+03</b>
1,3-Dichloropropene <sup>c</sup>	0	--	--	2.1E+02	--	--	1.1E+04	--	--	--	--	--	--	--	--	<b>1.1E+04</b>
Dieldrin <sup>c</sup>	0	7.1E-01	1.9E-03	5.4E-04	1.4E+00	9.5E-02	2.7E-02	--	--	--	--	--	--	<b>1.4E+00</b>	<b>9.5E-02</b>	<b>2.7E-02</b>
Diethyl Phthalate	0	--	--	4.4E+04	--	--	2.2E+06	--	--	--	--	--	--	--	--	<b>2.2E+06</b>
2,4-Dimethylphenol	0	--	--	8.5E+02	--	--	4.3E+04	--	--	--	--	--	--	--	--	<b>4.3E+04</b>
Dimethyl Phthalate	0	--	--	1.1E+06	--	--	5.5E+07	--	--	--	--	--	--	--	--	<b>5.5E+07</b>
Di-n-Butyl Phthalate	0	--	--	4.5E+03	--	--	2.3E+05	--	--	--	--	--	--	--	--	<b>2.3E+05</b>
2,4-Dinitrophenol	0	--	--	5.3E+03	--	--	2.7E+05	--	--	--	--	--	--	--	--	<b>2.7E+05</b>
2-Methyl-4,6-Dinitrophenol	0	--	--	2.8E+02	--	--	1.4E+04	--	--	--	--	--	--	--	--	<b>1.4E+04</b>
2,4-Dinitrotoluene <sup>c</sup>	0	--	--	3.4E+01	--	--	1.7E+03	--	--	--	--	--	--	--	--	<b>1.7E+03</b>
Dioxin 2,3,7,8-tetrachlorodibenzo-p-dioxin	0	--	--	5.1E-08	--	--	2.6E-06	--	--	--	--	--	--	--	--	<b>2.6E-06</b>
1,2-Diphenylhydrazine <sup>c</sup>	0	--	--	2.0E+00	--	--	1.0E+02	--	--	--	--	--	--	--	--	<b>1.0E+02</b>
Alpha-Endosulfan	0	3.4E-02	8.7E-03	8.9E+01	6.8E-02	4.4E-01	4.5E+03	--	--	--	--	--	--	<b>6.8E-02</b>	<b>4.4E-01</b>	<b>4.5E+03</b>

Parameter (ug/l unless noted)	Background Conc.	Water Quality Criteria			Wasteload Allocations			Antidegradation Baseline			Antidegradation Allocations			Most Limiting Allocations		
		Acute	Chronic	HH	Acute	Chronic	HH	Acute	Chronic	HH	Acute	Chronic	HH	Acute	Chronic	HH
Beta-Endosulfan	0	3.4E-02	8.7E-03	8.9E+01	6.8E-02	4.4E-01	4.5E+03	--	--	--	--	--	--	<b>6.8E-02</b>	<b>4.4E-01</b>	<b>4.5E+03</b>
Alpha + Beta Endosulfan	0	3.4E-02	8.7E-03	--	6.8E-02	4.4E-01	--	--	--	--	--	--	--	<b>6.8E-02</b>	<b>4.4E-01</b>	--
Endosulfan Sulfate	0	--	--	8.9E+01	--	--	4.5E+03	--	--	--	--	--	--	--	--	<b>4.5E+03</b>
Endrin	0	3.7E-02	2.3E-03	6.0E-02	7.4E-02	1.2E-01	3.0E+00	--	--	--	--	--	--	<b>7.4E-02</b>	<b>1.2E-01</b>	<b>3.0E+00</b>
Endrin Aldehyde	0	--	--	3.0E-01	--	--	1.5E+01	--	--	--	--	--	--	--	--	<b>1.5E+01</b>
Ethylbenzene	0	--	--	2.1E+03	--	--	1.1E+05	--	--	--	--	--	--	--	--	<b>1.1E+05</b>
Fluoranthene	0	--	--	1.4E+02	--	--	7.0E+03	--	--	--	--	--	--	--	--	<b>7.0E+03</b>
Fluorene	0	--	--	5.3E+03	--	--	2.7E+05	--	--	--	--	--	--	--	--	<b>2.7E+05</b>
Guthion	0	--	1.0E-02	--	--	5.0E-01	--	--	--	--	--	--	--	--	<b>5.0E-01</b>	--
Heptachlor <sup>c</sup>	0	5.3E-02	3.6E-03	7.9E-04	1.1E-01	1.8E-01	4.0E-02	--	--	--	--	--	--	<b>1.1E-01</b>	<b>1.8E-01</b>	<b>4.0E-02</b>
Heptachlor Epoxide <sup>c</sup>	0	5.3E-02	3.6E-03	3.9E-04	1.1E-01	1.8E-01	2.0E-02	--	--	--	--	--	--	<b>1.1E-01</b>	<b>1.8E-01</b>	<b>2.0E-02</b>
Hexachlorobenzene <sup>c</sup>	0	--	--	2.9E-03	--	--	1.5E-01	--	--	--	--	--	--	--	--	<b>1.5E-01</b>
Hexachlorobutadiene <sup>c</sup>	0	--	--	1.8E+02	--	--	9.0E+03	--	--	--	--	--	--	--	--	<b>9.0E+03</b>
Hexachlorocyclohexane																
Alpha-BHC <sup>c</sup>	0	--	--	4.9E-02	--	--	2.5E+00	--	--	--	--	--	--	--	--	<b>2.5E+00</b>
Hexachlorocyclohexane Beta-BHC <sup>c</sup>	0	--	--	1.7E-01	--	--	8.5E+00	--	--	--	--	--	--	--	--	<b>8.5E+00</b>
Hexachlorocyclohexane																
Gamma-BHC <sup>c</sup> (Lindane)	0	1.6E-01	--	1.8E+00	3.2E-01	--	9.0E+01	--	--	--	--	--	--	<b>3.2E-01</b>	--	<b>9.0E+01</b>
Hexachlorocyclopentadiene	0	--	--	1.1E+03	--	--	5.5E+04	--	--	--	--	--	--	--	--	<b>5.5E+04</b>
Hexachloroethane <sup>c</sup>	0	--	--	3.3E+01	--	--	1.7E+03	--	--	--	--	--	--	--	--	<b>1.7E+03</b>
Hydrogen Sulfide	0	--	2.0E+00	--	--	1.0E+02	--	--	--	--	--	--	--	--	<b>1.0E+02</b>	--
Indeno (1,2,3-cd) pyrene C	0	--	--	1.8E-01	--	--	9.0E+00	--	--	--	--	--	--	--	--	<b>9.0E+00</b>
Isophorone <sup>c</sup>	0	--	--	9.6E+03	--	--	4.8E+05	--	--	--	--	--	--	--	--	<b>4.8E+05</b>
Kepone	0	--	0.0E+00	--	--	0.0E+00	--	--	--	--	--	--	--	--	<b>0.0E+00</b>	--
Lead	0	2.4E+02	9.3E+00	--	4.8E+02	4.7E+02	--	--	--	--	--	--	--	<b>4.8E+02</b>	<b>4.7E+02</b>	--
Malathion	0	--	1.0E-01	--	--	5.0E+00	--	--	--	--	--	--	--	--	<b>5.0E+00</b>	--
Mercury	0	1.8E+00	9.4E-01	--	3.6E+00	4.7E+01	--	--	--	--	--	--	--	<b>3.6E+00</b>	<b>4.7E+01</b>	--
Methyl Bromide	0	--	--	1.5E+03	--	--	7.5E+04	--	--	--	--	--	--	--	--	<b>7.5E+04</b>
Methylene Chloride <sup>c</sup>	0	--	--	5.9E+03	--	--	3.0E+05	--	--	--	--	--	--	--	--	<b>3.0E+05</b>
Methoxychlor	0	--	3.0E-02	--	--	1.5E+00	--	--	--	--	--	--	--	--	<b>1.5E+00</b>	--
Mirex	0	--	0.0E+00	--	--	0.0E+00	--	--	--	--	--	--	--	--	<b>0.0E+00</b>	--
Nickel	0	7.4E+01	8.2E+00	4.6E+03	1.5E+02	4.1E+02	2.3E+05	--	--	--	--	--	--	<b>1.5E+02</b>	<b>4.1E+02</b>	<b>2.3E+05</b>
Nitrobenzene	0	--	--	6.9E+02	--	--	3.5E+04	--	--	--	--	--	--	--	--	<b>3.5E+04</b>
N-Nitrosodimethylamine <sup>c</sup>	0	--	--	3.0E+01	--	--	1.5E+03	--	--	--	--	--	--	--	--	<b>1.5E+03</b>
N-Nitrosodiphenylamine <sup>c</sup>	0	--	--	6.0E+01	--	--	3.0E+03	--	--	--	--	--	--	--	--	<b>3.0E+03</b>
N-Nitrosodi-n-propylamine <sup>c</sup>	0	--	--	5.1E+00	--	--	2.6E+02	--	--	--	--	--	--	--	--	<b>2.6E+02</b>
Nonylphenol	0	7.0E+00	1.7E+00	--	1.4E+01	8.5E+01	--	--	--	--	--	--	--	<b>1.4E+01</b>	<b>8.5E+01</b>	--
Parathion	0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB Total <sup>c</sup>	0	--	3.0E-02	6.4E-04	--	1.5E+00	3.2E-02	--	--	--	--	--	--	--	<b>1.5E+00</b>	<b>3.2E-02</b>
Pentachlorophenol <sup>c</sup>	0	1.3E+01	7.9E+00	3.0E+01	2.6E+01	4.0E+02	1.5E+03	--	--	--	--	--	--	<b>2.6E+01</b>	<b>4.0E+02</b>	<b>1.5E+03</b>

Parameter (ug/l unless noted)	Background Conc.	Water Quality Criteria			Wasteload Allocations			Antidegradation Baseline			Antidegradation Allocations			Most Limiting Allocations		
		Acute	Chronic	HH	Acute	Chronic	HH	Acute	Chronic	HH	Acute	Chronic	HH	Acute	Chronic	HH
Phenol	0	--	--	8.6E+05	--	--	4.3E+07	--	--	--	--	--	--	--	--	4.3E+07
Phosphorus (Elemental)	0	--	1.0E-01	--	--	5.0E+00	--	--	--	--	--	--	--	--	5.0E+00	--
Pyrene	0	--	--	4.0E+03	--	--	2.0E+05	--	--	--	--	--	--	--	--	2.0E+05
Radionuclides Beta and Photon Activity (mrem/yr)	0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Selenium	0	2.9E+02	7.1E+01	4.2E+03	5.8E+02	3.6E+03	2.1E+05	--	--	--	--	--	--	5.8E+02	3.6E+03	2.1E+05
Silver	0	1.9E+00	--	--	3.8E+00	--	--	--	--	--	--	--	--	3.8E+00	--	--
1,1,2,2-Tetrachloroethane <sup>C</sup>	0	--	--	4.0E+01	--	--	2.0E+03	--	--	--	--	--	--	--	--	2.0E+03
Tetrachloroethylene <sup>C</sup>	0	--	--	3.3E+01	--	--	1.7E+03	--	--	--	--	--	--	--	--	1.7E+03
Thallium	0	--	--	4.7E-01	--	--	2.4E+01	--	--	--	--	--	--	--	--	2.4E+01
Toluene	0	--	--	6.0E+03	--	--	3.0E+05	--	--	--	--	--	--	--	--	3.0E+05
Toxaphene <sup>C</sup>	0	2.1E-01	2.0E-04	2.8E-03	4.2E-01	1.0E-02	1.4E-01	--	--	--	--	--	--	4.2E-01	1.0E-02	1.4E-01
Tributyltin	0	4.2E-01	7.4E-03	--	8.4E-01	3.7E-01	--	--	--	--	--	--	--	8.4E-01	3.7E-01	--
1,2,4-Trichlorobenzene	0	--	--	7.0E+01	--	--	3.5E+03	--	--	--	--	--	--	--	--	3.5E+03
1,1,2-Trichloroethane <sup>C</sup>	--	--	--	1.6E+02	--	--	8.0E+03	--	--	--	--	--	--	--	--	8.0E+03
Trichloroethylene <sup>C</sup>	0	--	--	3.0E+02	--	--	1.5E+04	--	--	--	--	--	--	--	--	1.5E+04
2,4,6-Trichlorophenol <sup>C</sup>	0	--	--	2.4E+01	--	--	1.2E+03	--	--	--	--	--	--	--	--	1.2E+03
Vinyl Chloride <sup>C</sup>	0	--	--	2.4E+01	--	--	1.2E+03	--	--	--	--	--	--	--	--	1.2E+03
Zinc	0	9.0E+01	8.1E+01	2.6E+04	1.8E+02	4.1E+03	1.3E+06	--	--	--	--	--	--	1.8E+02	4.1E+03	1.3E+06

Notes:

1. All concentrations expressed as micrograms/liter (ug/l), unless noted otherwise
2. Discharge flow is highest monthly average or Form 2C maximum for Industries and design flow for Municipalities
3. Metals measured as Dissolved, unless specified otherwise
4. "C" indicates a carcinogenic parameter
5. For transition zone waters, spreadsheet prints the lesser of the freshwater and saltwater water quality criteria.
6. Regular WLA = (WQC x WLA multiplier) - (WLA multiplier - 1)(background conc.)
7. Antideg. Baseline = (0.25(WQC - background conc.) + background conc.) for acute and chronic  
= (0.1(WQC - background conc.) + background conc.) for human health
8. Antideg. WLA = (Antideg. Baseline)(WLA multiplier) - (WLA multiplier - 1)(background conc.)

Site Specific	
Metal	Target Value (SSTV)
Antimony	3.2E+04
Arsenic III	5.5E+01
Cadmium	3.2E+01
Chromium III	#VALUE!
Chromium VI	8.8E+02
Copper	7.4E+00
Lead	1.9E+02
Mercury	1.4E+00
Nickel	5.9E+01
Selenium	2.3E+02
Silver	1.5E+00
Zinc	7.2E+01

Note: do not use QL's lower than the minimum QL's provided in agency guidance

## Statistical Analysis – Stats.exe Results

Facility = Tappahannock WWTP (0.8 and 0.95 MGD)  
Chemical = Ammonia-N  
Chronic averaging period = 30  
WLAA = 10.2  
WLAC = 68.6  
Q.L. = .2  
# samples/mo. = 1  
# samples/wk. = 1

### Summary of Statistics:

# observations = 1  
Expected Value = 3  
Variance = 3.24  
C.V. = 0.6  
97th percentile daily values = 7.30025  
97th percentile 4 day average = 4.99137  
97th percentile 30 day average= 3.61815  
# < Q.L. = 0  
Model used = BPJ Assumptions, type 2 data

No Limit is required for this material

The data are: 3.0 mg/L

This evaluation applies to both design flows tiers (0.8 and 0.95 MGD) of this permit.

Ammonia-N is a component of TKN (40-60%). The permit contains a TKN limitation of 3.0 mg/L based on the stream sanitation analysis. The ammonia-N discharged cannot exceed 3.0 mg/L due to the presence of the TKN limitation. For this reason, an expected value of 3.0 mg/L Ammonia-N was used to determine the need for a permit limitation. No limitation is needed for this parameter.

Facility = Tappahannock WWTP (0.8 and 0.95 MGD)  
Chemical = Zinc, dissolved  
Chronic averaging period = 4  
WLAA = 180  
WLAC = 4100  
Q.L. = 1  
# samples/mo. = 1  
# samples/wk. = 1

### Summary of Statistics:

# observations = 1  
Expected Value = 1.3  
Variance = .6084  
C.V. = 0.6  
97th percentile daily values = 3.16344  
97th percentile 4 day average = 2.16292  
97th percentile 30 day average= 1.56786  
# < Q.L. = 0  
Model used = BPJ Assumptions, type 2 data

No Limit is required for this material

The data are:

1.3 µg/L

Zinc was reported on the permit application as present in the effluent at a concentration of 1.3 µg/L. Although this was below the agency required quantification level of 3.6 µg/L, it is a quantifiable concentration and a reasonable potential analysis was performed. No limit is needed.

Facility = Tappahannock WWTP - Alternate  
disinfection Part I.B. (0.8 and 0.95 MGD)  
Chemical = Chlorine Produced Oxidant → Effluent  
TRC limits  
Chronic averaging period = 4  
WLAa = 26  
WLAc = 380  
Q.L. = .1  
# samples/mo. = 90  
# samples/wk. = 21

Summary of Statistics:

# observations = 1  
Expected Value = 20000  
Variance = 1440000  
C.V. = 0.6  
97th percentile daily values = 48668.3  
97th percentile 4 day average = 33275.8  
97th percentile 30 day average= 24121.0  
# < Q.L. = 0  
Model used = BPJ Assumptions, type 2 data

A limit is needed based on Acute Toxicity  
Maximum Daily Limit = 26  
Average Weekly limit = 13.5384800231324  
Average Monthly Limit = 11.9556495015095

The data are:  
20000 µg/L

A reasonable potential analysis was performed on Chlorine Produced Oxidant (CPO) due to the inclusion of Permit Part I.B Additional Chlorine Limitations and Monitoring Requirements. This special condition is designed to allow the permittee to convert to a chlorine disinfection system (designed in accordance with the SCAT regulations) without requiring a major permit modification.

Per GM00-2011 a datum of 20,000 µg/L is used to force the TRC limitation. As indicated in GM 10-2003, the CPO in-stream saltwater limits are met by applying Total residual Chlorine (TRC) limits to the facility's effluent.

**Attachment H: Stream Sanitation Memorandums (12/29/06  
and 8/13/96)**

# MEMORANDUM

## DEPARTMENT OF ENVIRONMENTAL QUALITY *Piedmont Regional Office*

4949-A Cox Road, Glen Allen, VA 23060-6296

804/527-5020

**SUBJECT:** Stream Sanitation Analysis – Hoskins Creek  
Town of Tappahannock STP (VA0071471)

**TO:** Denise M. Mosca

**FROM:** Jennifer V. Palmore *JVP*

**DATE:** December 29, 2006

**COPIES:** Allan Brockenbrough, Mark Alling, Modeling File

A request for a stream sanitation analysis for the Town of Tappahannock's sewage treatment plant was received on December 4, 2006. The facility currently discharges to Hoskins Creek in at a design flow of 0.8 MGD and is requesting a tiered permit expansion to 0.95 MGD.

### **Previous Modeling**

The discharge was last modeled by Jon van Soestbergen in 1996 using the Regional Tidal Model (Auto\$\$) (see attached memorandum dated August 13, 1996.) At that time, the facility was discharging 0.4 MGD and was requesting an expansion to 0.8 MGD. Analysis of the ambient water quality at the site led to the conclusions that Hoskins Creek meets the water quality criteria for dissolved oxygen during most conditions, that water quality data collected at station 3-HOK000.74 near the mouth of the creek is approximately representative of water quality at the discharge location and that data collected from 1974-1979 may not be representative of the conditions in 1996 and was excluded. Only data collected after 1990 was used.

The modeling analysis showed that dissolved oxygen nears 5.0 mg/L under the modeled flow conditions, therefore Hoskins Creek was considered a Tier 1 water and antidegradation was not applied. Hoskins Creek is bordered by marshes along a significant portion of its length, therefore the regional and central office staff decided to perform a comparative analysis of dissolved oxygen concentrations at the then-existing and proposed design flows to ensure that the dissolved oxygen concentrations in the stream would not significantly change after the expansion.

### **Ambient Water Quality**

Hoskins Creek was most recently assessed in the 2006 305(b)/303(d) Integrated Report. The segment is considered a Category 5A water and fact sheets for the impairments are attached. This segment was initially included on the 1994 303(d) list based on excessive fecal coliform standard violations recorded at the Rt. 360 bridge (3-HOK000.74). The upstream limit was extended to the Town of Tappahannock STP in the 1998 cycle in recognition that the STP may be a contributing source, although this has not been verified. During the 2006 cycle, the segment remained impaired for fecal coliform and enterococci was added as an impairing cause with a violation rate of 9/12. Hoskins Creek is also considered impaired due to chloride and pH violations. The chloride is attributed to natural salinity and a correction of the Water Quality Standards has been requested. The pH impairment is attributed to freshwater inflow of water with low DO and low pH from marsh drainage in the upstream tidal creek. In addition, the mesohaline portion of the Rappahannock estuary, including Hoskins Creek, failed the open water summer dissolved oxygen criteria and the submerged aquatic vegetation (SAV) acreage standards during the 2006 cycle.

Since the 1996 modeling analysis, there has been a change in the dissolved oxygen Water Quality

Standard in tidal waters. As stated above, the DO criteria now apply to the entire mesohaline Rappahannock River and its tidal tributaries and are no longer site specific criteria specific to individual creeks. The entire segment is considered impaired for dissolved oxygen during the summer months. Analysis of data collected in Hoskins Creek indicates that although the lower, flushed portion of Hoskins Creek does not appear to have significant dissolved oxygen concerns, the upstream portion does experience depressed DO levels, presumably due to the marshy drainage.

The previous analysis determined that older data may not be representative of current conditions and should not be used. I concur with continuing this approach and using data collected from 1990-present. During this period, data was collected at four locations:

- the ambient station at the Route 360 bridge (3-HOK000.74)
- a TMDL station off the end of Route T-1004 (3-HOK000.15)
- a TMDL station off the end of Route T-1031 (3-HOK002.74)
- a special study station at the Route 659 bridge (3-HOK003.61)

Data for all of the stations was reviewed and is attached. Although data at station 3-HOK003.61 shows lower dissolved oxygen and pH levels than at the ambient station, I recommend that station 3-HOK000.74 continue to be used for other modeling purposes due to its more robust data set and to allow continuity between the past and present modeling efforts.

### **Current Modeling Approach**

Hoskins Creek was modeled using DEQ's Tidal Prism Model-VPDES Expert System (TPWQM-VPDES) which was developed by the Virginia Institute of Marine Science. The nutrient sensitive, summer tier, saline system model was chosen.

Channel characteristics were taken from the 1996 model and associated site visit, the USGS Tappahannock and Mount Landing Quadrangles, and the Alexandria Drafting Company (ADC) 7<sup>th</sup> edition Chesapeake Bay Maryland & Virginia Chartbook.

The tidal range for the system was taken from the National Oceanic and Atmospheric Administration's (NOAA's) website <http://tidesandcurrents.noaa.gov/tides06/tab2ec2c.html>. The mean tidal range for the Rappahannock River at Tappahannock was chosen.

Freshwater inflows to the model were calculated by drainage area proportion between the tidal limit and the previously operated continuous-record gage Hoskins Creek near Tappahannock (#01668800), which was located at the Route 717 bridge. The flow frequency memorandum is attached.

The model requires the salinity information at the mouth of the creek. The mean salinity from station 3-HOK000.15 was used since it is the most downstream water quality station in Hoskins Creek.

For the background conditions, a total phosphorus concentration of 2.0 mg/L was used to match the current effluent limits. At the 0.95 MGD expansion, the model was run at both the current 2.0 mg/L and 0.3 mg/L to match the Chesapeake Bay Nutrient Allocation. There was no difference in the results between the two model scenarios.

The TKN limit of 3.0 mg/L was used to maintain the current permit limit. As this facility has received a Chesapeake Bay Waste Load Allocation for nitrogen, the low TKN limit is deemed appropriate. The cBOD<sub>5</sub> limit was adjusted until the more stringent of the daily minimum DO and daily mean DO was maintained at the current levels, as determined by the background condition model. Model documentation and results are attached.

### **Model Results**

Modeling indicates that at the following VPDES permit limits there will be no reduction of daily minimum and daily mean dissolved oxygen levels in Hoskins Creek from the expanded design flow:

Q:	0.95 MGD
cBOD <sub>5</sub> :	20 mg/L
TKN:	3.0 mg/L

DO: 5.0 mg/L

If you have any questions about this analysis or need any additional information, please do not hesitate to contact me.

JAN. -13' 03(MON) 10:41 VIRGINIA DEQ-KSO-

TEL:8044350485

P.002

*Attachment H 1)*

AUG 20 1996

MEMORANDUM

DEPARTMENT OF ENVIRONMENTAL QUALITY  
Piedmont Regional Office

4949-A Cox Road, Glen Allen, VA 23060-6296

804/527-5020

SUBJECT: Results of Stream Sanitation Analysis and Effluent Discharge Recommendations  
Town of Tappahannock Municipal STP Discharge to Hoskins Creek (VA0071471)

TO: Curt Linderman

FROM: Jon van Soestbergen *jl*

DATE: August 13, 1996

COPIES: Debra Barnes, Modeling File

*Site visit  
memo*

The Town of Tappahannock has submitted a VPDES permit application for an increased discharge to Hoskins Creek. The proposed increase in flow is from 0.4 mgd to 0.8 mgd. As a result of the application, a stream sanitation analysis was performed to predict the impact of the increased discharge on dissolved oxygen concentrations in Hoskins Creek and to establish recommendations for VPDES permitted effluent limits related to dissolved oxygen. A site visit was performed by PRO planning staff and the permit writer on June 12, 1996. Flow frequency information used to establish background flows was received from DEQ Central Office on June 26, 1996. STORET data was analyzed to determine whether the receiving stream is currently impaired. In consultation with Central Office modeling staff, the regional tidal model (AUT09\$) was used to perform a comparative analysis of DO concentrations in Hoskins Creek under existing and proposed expanded conditions, and to predict the level of treatment required under expanded conditions.

The base line (existing condition) model predicts the DO concentration in Hoskins Creek will just barely meet the average-daily DO standard (5.0 mg/l) under the modeled flow conditions. Therefore, Hoskins Creek is considered a Tier 1 water at the discharge point.

*As a result of the stream sanitation analysis for Hoskins Creek, the following VPDES permit limits for the subject treatment facility are recommended to maintain water quality in Hoskins Creek.*

Q:	0.8 mgd
cBOD <sub>5</sub> :	25.0 mg/l
TKN:	3.0 mg/l
DO:	5.0 mg/l

The Regional Tidal Model (AUT09\$) was used to simulate DO concentrations in Hoskins Creek. Because Hoskins Creek is bordered by marshes, Central Office modeling staff (M.D. Phillips) was consulted, and it was decided to perform a comparative analysis in which proposed alternatives were compared to a modeled base line (existing conditions). Model documentation, as well as documentation of data and statistics used to establish background flows, background concentrations of critical parameters, and boundary conditions, is included as an attachment.

Should you have any questions regarding this stream sanitation analysis, or require additional information, please do not hesitate to contact the PRO Planning Group.

Hoskins Creek Tidal Model - Tappahannock STP Expansion  
Page 2

The remainder of this memorandum summarizes the methodology used in performing the stream sanitation analysis and in establishing the recommended VPDES permit limits.

Background Conditions

The Town of Tappahannock currently operates a sewage treatment plant (STP) which discharges to Hoskins Creek at river mile 3-HOK002.90. The discharge is on the north side of the creek, between the Route 659 bridge and the Route 360 bridge. Hoskins Creek is located in DEQ planning watershed VAP-Route 659, and is tributary to the Rappahannock River at river mile 3-RPP043.20. At the discharge point, Hoskins Creek is tidally influenced. The fall line is estimated to be at river mile 3-HOK006.20. A copy of the topographic map, showing Hoskins Creek, the discharge location, and the fall line location, is included as an attachment.

The discharge is currently permitted for 0.4 mgd, with a BOD<sub>5</sub> limit of 30 mg/l. There is no limit for TKN or DO in the current VPDES permit. The effect of the discharge to Hoskins Creek has not been previously modeled.

At the discharge location, water quality in Hoskins Creek is influenced by two environmental factors in addition to the STP discharge, tidal fluctuation in the Rappahannock River and in Hoskins Creek, and drainage from marshes bordering Hoskins Creek. During warm weather conditions, these factors have opposing effects on DO concentrations in Hoskins Creek. The marsh drainage tends to be low in DO, and depress DO concentrations, whereas the tidal influences of the Rappahannock tend to elevate the DO levels. In cold weather, the marsh drainage is not expected to significantly affect DO concentrations in the creek.

Water Quality Assessment

Hoskins Creek was assessed fully supporting of all Clean Water Act Use Goals in DEQ's 1996 305(b) Report to EPA. DEQ maintains an ambient water quality monitoring (AWQM) station on Hoskins Creek at the Route 360 bridge. This station has been in place since 1968. Additionally, there is historical data for Hoskins Creek from an AWQM station maintained by DEQ at the Route 659 bridge over the creek from 1974 through 1979. Another AWQM station is maintained by DEQ on the Rappahannock River at 3-RPP042.12, which is near its confluence with Hoskins Creek.

Data from both AWQM stations were analyzed for this stream sanitation analysis to determine whether existing water quality in Hoskins Creek is impaired and to establish background and boundary conditions for the modeling effort. Data from 1990 to the present at AWQM station 3-HOK000.74 was analyzed to determine impairment; historical data from both Hoskins Creek AWQM stations was compared to determine whether data at 3-HOK000.74 is representative of conditions upstream of the discharge (i.e. background conditions); and finally a comparison of historical (1974-1979) to recent (1990-1996) data for the active Hoskins Creek AWQM station (3-HOK000.74) was performed to determine whether historical data for Hoskins Creek is representative of existing conditions.

Analysis of DO data for Hoskins Creek collected at AWQM station 3-HOK000.74 from January 1990 through May 1996 identified 2 violations of the instantaneous DO standard (4.0 mg/l) in 70 data points collected. Both violations were recorded during warm weather conditions. This data suggests that, although Hoskins Creek is subject to depressed DO levels in the summer as a result of drainage from adjacent marshes, the effects are not severe enough to cause impairment, except in isolated cases.

Comparison of data collected at the two Hoskins Creek AWQM stations during the time period in which the upstream AWQM station was active, suggests that water quality at the two stations approximately

Hoskins Creek Tidal Model - Tappahannock STP Expansion  
Page 3

follows the same trends, although concentrations of individual DO related parameters differed slightly. Upstream, the average DO and cBOD<sub>5</sub> concentrations were slightly lower, and the TKN was approximately the same. The average temperature was also slightly lower at the upstream station.

Comparison of the historical (1974-1979) data collected at AWQM station 3-HOK000.74 to the more recent data (1990-1996) suggests that the average DO concentration has increased over time. However, lower average temperatures during the more recent time period may have contributed to the apparent increase in DO concentrations. On average, the data suggests that cBOD<sub>5</sub> concentrations also decreased, but that TKN concentrations increased.

*From the analysis of the AWQM data, it was concluded that:*

- *Hoskins Creek water quality currently meets water quality standards for dissolved oxygen, except in rare, extreme cases.*
- *DO related water quality data collected at AWQM station 3-HOK000.74 is approximately representative of water quality at the discharge location.*
- *Water quality data collected in the 1974-1979 time period may not be representative of current water quality data, and should therefore not be used for assessment purposes or to establish background conditions for modeling purposes.*

#### Modeling Approach

The Regional Tidal Model (AUTOS\$) was used to simulate the concentrations of DO related water quality parameters in Hoskins Creek. Hoskins Creek is bordered by marshes along significant portions of its length. Because guidance for the use of the model indicates that the model may not be appropriate for estuaries where more than 5 percent of the estuary is bordered by marshes, DEQ Central Office modeling staff (M.D. Phillips) was consulted. It was decided, given the characteristics of the estuary and the AWQM data, that the best utility of the model would be in performing a comparative analysis. In this type of analysis, existing conditions are modeled to establish base line concentrations of critical parameters. Proposed alternatives are then simulated and the resulting in-stream concentrations of critical parameters are compared to predict the effects on DO concentrations in the water body being modeled. Physical site characteristics, background flows and concentrations, and boundary conditions for the model were established as follows:

1. Physical Characteristics: Channel depth was measured at the Route 659 bridge during the site visit. At the discharge location and at the Route 360 bridge, channel depths were estimated. Channel widths were estimated from observation during the site visit and from USGS topographic maps.
2. Background Flows and Concentrations: Background flow (flow into the modeled area from upstream) was obtained from DEQ Central Office, as documented in a June 26, 1996 memorandum. Background concentrations were determined by calculating the 90th percentile concentrations for BOD<sub>5</sub> and TKN, and the 10th percentile concentration for DO. The 90th percentile temperature was also calculated. Data used for the calculations was obtained for the period January 1990 through May 1996 from AWQM station 3-HOK000.74.
3. Boundary Conditions: Because the upstream limit of the modeled area is below the fall line of Hoskins Creek, no boundary condition was set at the upstream limit of the model. At the downstream limit of the model, the Rappahannock River creates a boundary condition. As such,

Hoskins Creek Tidal Model - Tappahannock STP Expansion  
Page 4

boundary condition concentrations for the downstream limit were calculated similarly to the background concentrations described above, except that data from AWQM station 3-RPP042.12 were used.

As stated previously, a base line condition was established to predict concentrations of critical parameters under existing conditions. Alternatives were then modeled and the results compared to the base line to predict the effects of the alternative discharges on DO concentrations.

#### Model Results

The base line model predicts that the DO concentration in Hoskins Creek will just barely meet the average daily DO standard (5.0 mg/l) under the modeled existing flow (0.4 mgd) conditions. Modeling of several alternatives, in which the discharge flow was increased to 0.8 mgd and cBOD<sub>5</sub>, TKN, and DO concentrations were varied, resulted in the recommendations presented in this memorandum. An alternative with a low TKN concentration was chosen because the permit writer indicated that the effluent limit for ammonia is predicted to be 0.29 mg/l to prevent ammonia toxicity. The treatment required to meet this ammonia limit is expected to also control nBOD in the effluent and be unaffected by the low TKN limit. The recommended VPDES permit limits are predicted to result in a discharge that does not significantly change the DO concentrations in the receiving stream from the modeled existing condition.

**Attachment I: CTO for nutrient removal technology  
(7/23/2010)**

## CERTIFICATE TO OPERATE

**OWNER:** Town of Tappahannock

**FACILITY/SYSTEM NAME:** Tappahannock Wastewater Treatment Plant

**PERMIT NUMBER:** VA0071471

**DESCRIPTION OF FACILITY/SYSTEM:** This CTO addresses the conversion of the existing oxidation ditches to a 4-stage Bardenpho process with tertiary filters. The project has been designed to improve nutrient removal to 4 mg/l TN and 0.3 mg/l TP (annual average limitations) at an annual average flow of 0.8 MGD. The discharge point is unchanged.

The projects covered under this CTO include the following:

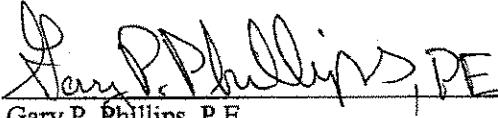
- in-line equalization basin with mixers and diffusers;
- new anoxic basin including mixers that serves as the first stage of a 4-Stage Bardenpho process;
- the existing oxidation ditch basins (two existing trains) are converted into the other three stages of the 4-Stage Bardenpho process (i.e., aerobic zone 1, anoxic zone 2, and aerobic zone 2). Each "converted" oxidation ditch contains nitrate recycle pumps, anoxic mixers, and fine bubble diffusers with associated blowers;
- a new recycle pump station to facilitate the return of nutrient laden recycle streams to the equalization basin for bio-augmentation;
- new deep-bed tertiary filtration is provided to achieve total suspended solids and particulate phosphorus removal;
- a new filter feed pump station feeds the tertiary filters;
- chemical storage and feed for alkalinity, polymer, and carbon source;
- new aerobic digester with associated blowers and coarse bubble diffusers;
- and other minor changes.

The sewage treatment works has a Reliability Class I designation and will continue to meet the requirements of this classification by the provision of emergency generators (one new), alarms, and SCADA to monitor and relay status and alarms to 24 hour manned locations.

**AUTHORIZATION TO OPERATE:**

The owner is authorized to operate this facility in accordance with Section 190 of the Commonwealth of Virginia's *Sewage Collection and Treatment Regulations*.

**ISSUED BY:**

  
Gary P. Phillips, P.E.  
Wastewater Engineering  
Department of Environmental Quality

July 23, 2010  
Date